PRODUCTS finishing

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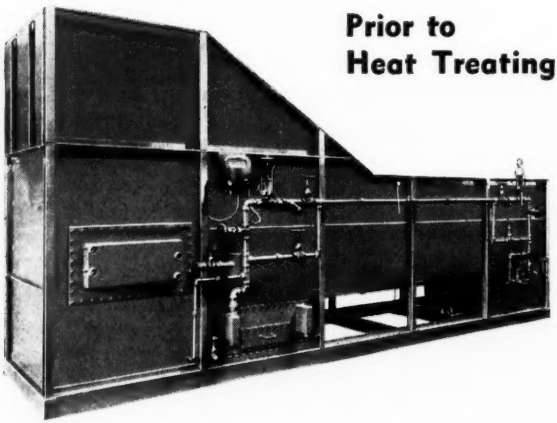

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Products Finishing

Cincinnati, Ohio

Vol. 2, No. 2

November, 1937

Finishing Products with Aluminum Paint

In this article, the author deals with the use of aluminum paint in the products finishing field. In it are discussed the unique qualities which have fitted aluminum paint to this type of service, as well as some of the technical aspects of application.

By Everett R. Sterling

IN DISCUSSING the place of aluminum paint in the products finishing field, it is well to point out first the important properties of this paint. Like other paints, aluminum paint consists of a finely divided pigment dispersed in a vehicle. The methods of application are the same and only minor modifications of application technique are required to obtain satisfactory results. The pigment for aluminum paint is available in two forms, namely as a paste or powder, which is made up of tiny flakes of pure aluminum. The pigment comes in various grades of fineness, ranging from very coarse, 120 mesh, to the extremely fine lining grades, -400 mesh. The latter pigment is the one recommended for the very smooth finishes required for most manufactured articles.

When mixed with the correct vehicle and applied to a surface, the flake-like pigment disperses throughout the film and the particles arrange themselves in more or less parallel layers with vehicle in between. A portion of the aluminum flakes remain on the surface, forming there a practically continuous metal layer. These layers of aluminum flakes are opaque to light, in fact, a single coat of aluminum paint uniformly applied, even in a very thin film, will hide any underlying surface.

The metal-like sheen of aluminum paint is the result of the collective reflectivity of countless thousands of aluminum flakes. A smooth surface painted with aluminum paint, made with the fine pigment, has the appearance of polished metal, even on close inspection. Where the effect of a

bright metal finish is desired without polishing, aluminum paint may offer a satisfactory substitute.

The metallic lustre of aluminum paint recommends its use on many products. A decorative stripe of aluminum paint is as eye-arresting as a strip of metal, while a complete coat of aluminum paint on wood or metal toys, for example, has proved an effective sales advantage.

Aluminum paint functions best only when the correct type of vehicle is chosen. These vehicles have been developed and they will meet practically every need in the products finishing field. The important characteristics of the available vehicles are described in the following classifications:

Long Oil Varnish. This vehicle produces an aluminum paint with a reasonably hard film possessing good elasticity and durability. It is recommended for use on weather-exposed metal surfaces and for products subject to severe moisture conditions. Long oil varnish can be baked on or, if necessary, force-dried.

Phenolic Resin Base Varnish. This vehicle produces a harder and more abrasion resisting film than a long oil varnish, in addition to improved elasticity and durability. Its moisture and chemical resistance are excellent. Phenolic Resin base varnish is suitable for both metal and wood and can be used on either inside or outside exposures. Baking of this finish further improves its normal characteristics.

Alkyd Resin Base Varnish. This vehicle is most widely used for production finishes, because of its rapid air-drying characteristics, which consist of excellent baking properties and chemical resistance. It is frequently used as a clear top coat over the aluminum finish because of its light color and absence of after yellowing.

Nitrocellulose Lacquer. The modern low solid viscosity lacquers make durable vehicles for aluminum paint that are proving useful in many places. This type of vehicle is especially recommended where quick drying is

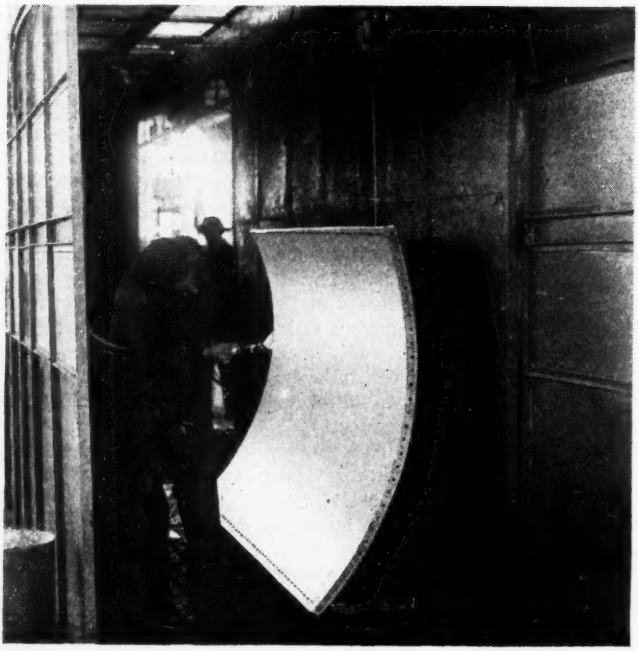

Fig. 1—This view illustrates how tank sheets are production sprayed with aluminum paint.

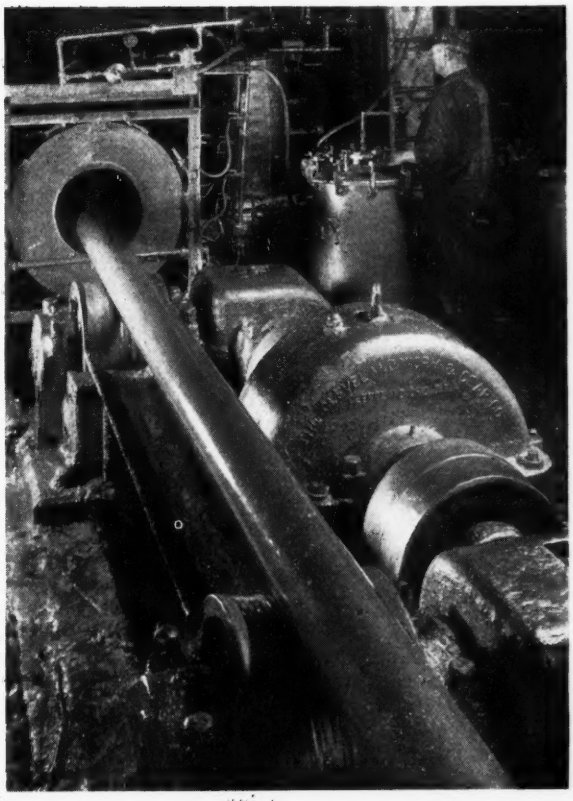

Fig. 2—Coating steel pipe with aluminum paint.

essential and where products are to be exposed to the weather.

The technique of mixing and applying aluminum paint differs in some respects from that used for other paints, however, it may be sprayed, dipped, flow-coated or applied by roller coating. The difference lies in the fact that the character of the vehicle used depends upon the method of application as does the amount and type of pigment. The paint manufacturer should be consulted, since in many cases, aluminum paint must be tailor-made to suit the work at hand.

Aluminum paint may be purchased either in the ready-mixed form, or vehicle and pigment separate, and mixed as required. In mixing the vehicle and pigment together on the job, great care should be exercised in accurately weighing and measuring the amounts of pigment and vehicle. In mixing, the vehicle should be poured over the pigment and never should the pigment be added to the vehicle. The weighed amount of pigment should be placed in the bottom of a large mixing container and the vehicle added, at first in very small quantities, and thoroughly incorporated before additional amounts are poured in. When all of the vehicle has been mixed with the pigment, the aluminum paint should be strained through several thicknesses of cheesecloth. The paint should be agitated during application, but not vigorously or for too long a time, as excessive agitation tends to darken the paint and destroy leafing. However, the paint in the mixing container should be stirred each time any of it is removed in order to retain the uniformity of the mixture.

Occasionally, it is desirable to tint aluminum paint with some pigment in order to obtain an interesting metallic color effect. In industrial service, tinted paint is sometimes used to give

more contrast between succeeding coats. In the case of products finishing, unusual and interesting effects may often be obtained through the use of the tinting pigments.

Prussian blue, for example, produces a deep blue tint; chrome green gives a green tint, and chrome yellow, a light green. Yellow ocher produces light yellow tint; carbon black gives a gun-metal gray; and lead carbonate creates a battleship gray. Spanish iron oxide may be used for a light pink tint and toluidine red for a rose tint. Tinting pigments are added to the vehicle and thoroughly incorporated before the vehicle is mixed with the paste or powder. After the tinted aluminum paint has been mixed it should be permitted to stand until all the floating or leafing of the aluminum pigment has disappeared. Paints of this type are best purchased in ready-mixed form, that is, tinted to the desired shade by the paint manufacturer.

Aluminum paint may be applied to most products by means of a spray gun. Nozzles are available that are made especially for use with aluminum paint. Guns that operate at low pressures with high air volume are preferred because they permit the paint to be more easily atomized. The spray width should not be over 18 in., and preferably under 12 inches. Air agitation in the mixing or storage tanks should be avoided as it causes some vehicles to thicken and also interferes with leafing. The occasional use of a hand agitator is ample to keep the paint uniform during continuous operation, although a thorough stirring should follow a long interruption.

Since aluminum paint shows unusual covering power, some operators are tempted to apply films that are too thin for good durability. A coverage that averages better than 600 sq. ft. per gallon may be satisfactory if durability requirements are not high. However, under some conditions it is possible to obtain coverage as high as 1,000 sq. ft. per gallon and still obtain a satisfactory finish.

Where the volume of work is large and the shape and nature of the product warrants it, aluminum paint may be applied by dipping. Extreme care must be exercised to select the vehicle best suited in each case, in order to obtain the correct flowing and baking properties. A number of such vehicles are now available, but each must be adjusted to the particular job at hand.

For successful dipping, the article should be free from grease, or the paint will not hold to the surface. Dipping in a hot solution of trisodium phosphate, and subsequent washing in clear hot water will remove the grease. Dipping may be done by hand or by special machines that have been developed for this type of work. Careful control should be exercised over the withdrawal, since the surface tension of the liquid helps to remove excess material and reduce dripping losses. As a general rule, from six to twelve inches withdrawal rate will produce the desired result. Drying time should be such that complete leafing occurs before the initial set. Baking improves appearance by keeping the vehicle plastic and aids in closing up areas that are broken.

It is desirable to keep the paint in the dipping tank clean and free from skins and sediment. Occasionally the tank should be cleaned, and the paint should be strained at intervals. When the tank is not in use it should be kept covered with a sheet of butcher's wrapping paper, which is allowed to contact the entire surface of the paint. This prevents the formation of skin and reduces oxidation and evaporation. The paper can be removed and thrown away each time the tank is

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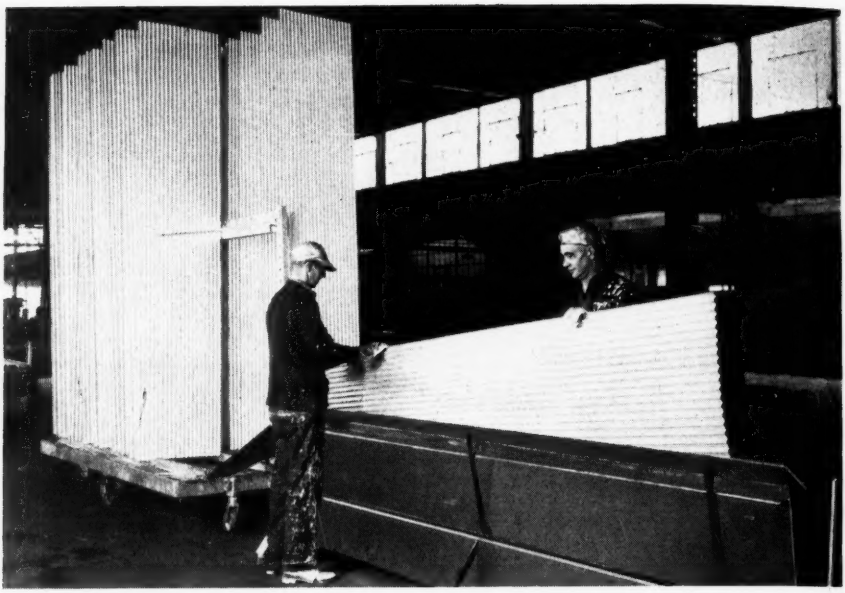

Fig. 3—Coating corrugated metal sheets with aluminum paint by means of the dipping process.

put back in service. The small expense of this procedure is well worth while.

Flow coating is a modification of the dipping method. Flow coating machines are used that are especially designed to flood or spray a large volume of paint over an object. The excess drips off, and is recovered and returned to the system. Flow coating is useful where the object is of such size and shape that dipping is not practical.

Sometimes sheet metal is decorated with aluminum paint by application through roller coating machines. Functioning something like a printing press, these machines are capable of producing unusual and artistic effects. Where roller coating machines are used, a specially formulated varnish vehicle and the finest grade of aluminum paste or powder are necessary.

It is possible to create a burnished aluminum finish on a non-absorbent surface by dusting the surface with fine lining aluminum powder and then rubbing it briskly with lint-free cloth. A protective coating of clear lacquer or varnish may be applied. However, since this procedure involves considerable hand work and is relatively costly, its uses are limited to a comparatively few products.

The following part of this article is concerned with the types of surface commonly encountered, and the technique of applying aluminum paint suited to each.

Aluminum paint is used for a wide variety of surfaces, including steel, iron, tin, aluminum, concrete, brick, gypsum, and wallboard, canvas, asphalt and tar, plaster, and wood. Of particular interest to the products finisher is the application of aluminum paint to metals, especially to

steel. Aluminum paint has been used successfully on products subject to both exterior and interior exposure. Examples familiar to the products finisher include motor housings, mail boxes, toys, meter boxes and machinery.

Unless unusual service conditions are to be encountered, no primer is needed for aluminum painted steel products. However, preparation for painting should include a thorough cleaning of the surface including removal of all rust, dirt, and grease. Rust and dirt may be removed by brushing, and a washing with mineral spirits or gasoline will remove the grease. A strong solution of soap and water, with a clear water rinse may also be used to remove the grease. The surface should be absolutely dry before applying the paint.

Sometime, rust and scale accumulate on a steel surface and this should be removed before painting, by sandblasting, steel scrapers, or wire brushes. On production jobs, pickling in an acid solution will give good results.

In painting steel products, spraying is the most common method of application. Choice of pigment and vehicle may be left to the recommendation of the paint manufacturer or dealer. One recommended formula includes 1¼ lb. of extra fine lining aluminum paste to a gallon of glycerol-phthalate resin base varnish, with a pint of coal tar solvent naphtha used as a thinner. Two pounds of standard aluminum paste can be used instead of the extra fine lining paste, and as an alternate vehicle, phenolic resin base varnish, long oil varnish or nitrocellulose lacquer.

Properly applied, any of these formulas should yield from 400 to 800 sq.ft. per gallon.

If the product is to be painted by dipping instead of spraying, 1¼ lb. of extra fine lining powder to the gallon of glycerol-phthalate resin varnish

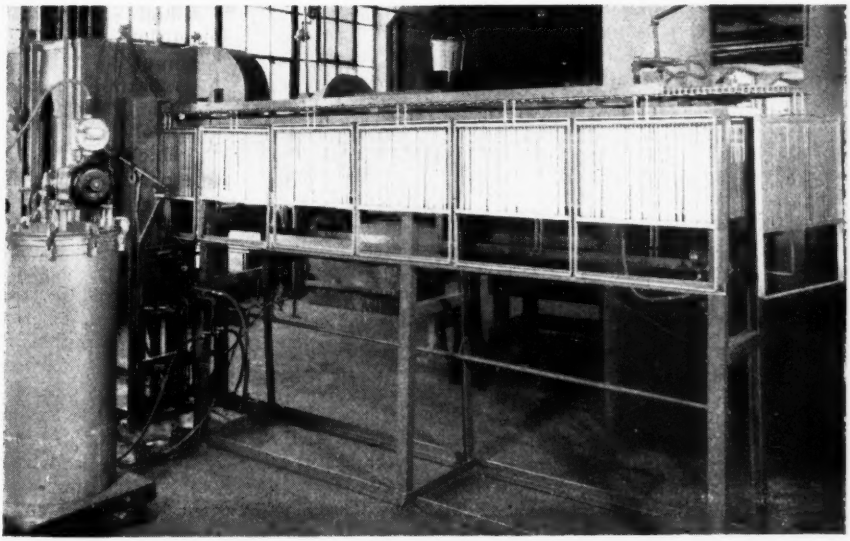

Fig. 4—Automatic painting of hacksaw blades with aluminum paint.

may be used. The vehicle used for dipping as well as the pigment must be adjusted to the individual dipping problem. In general, the vehicle is selected as a basis of feal retention properties and good flowing characteristics.

If the iron or steel is to be employed out-of-doors, the aluminum paint should be preceded by application of a priming coat of red lead or some other good rust inhibitive primer. Under unusually severe condition, two coats of aluminum paint succeeds the priming coat.

Galvanized iron may also be painted with aluminum, and here too technique varies for exterior and interior surfaces. On surfaces such as corrugated siding, downspouts, ventilators, and roofing, aluminum is used both as a primer and finishing coat. Ordinarily it is advisable to allow the surface to weather for at least six months before applying the paint, if this is possible. In product finishing this procedure is usually not practical, and artificial weathering is employed to approximate the same results. One of the methods used is to wash the surface with a solution of copper sulphate or copper acetate in warm water. The metal must be allowed to dry before applying the paint. A long oil varnish or a glycerole phthalate resin base varnish may be used for a vehicle on galvanized iron. Standard paste or standard lining powder is recommended as a pigment material.

The technique of painting aluminum with aluminum paint is similar in most respects to that employed for other metals. If painting is done purely for decorative reasons, little preparation is needed aside from cleaning the metal with some good solvent such as a mild alkaline cleaner or better still, a phosphoric acid cleaner. The latter forms a film of aluminum phosphate over the surface of the metal which helps resist corrosion. It is necessary to see that the metal is thoroughly dry before the paint is applied.

Where aluminum paint is used as a protection for aluminum, a special primer is sometimes employed. This primer should have good resistance to moisture penetration, should adhere well, and form a good base for succeeding coats.

Once the primer has been applied, the aluminum paint, or any other desired paint may be put on. Where fast drying finishes are required, nitro-cellulose lacquers may be used. These can be obtained in any desired shade including aluminum. Aluminum pigmented lacquers are extremely durable and are recommended for hard service conditions.

Aluminum surfaces commonly protected by aluminum paint include bodies for aircraft, buses and trucks, window frames and spandrels and any other aluminum product subject to severe corrosive conditions.

Frequently, aluminum paint is used as a decorative coating for tin plated cans and boxes. This is a specialized use and involves the application of special vehicles and pigments, adapted in each case to the type of finish desired and the kind of machine on which they are used. Extra fine lining paste or powder is recommended for this work, in the proportion of 1½ lb. of powder to the gallon of vehicle. A special synthetic resin vehicle is used, which may be adjusted for operation on coating rolls by the addition of various lithographic linseed oil, varnishes and driers. The coating is always baked. Because of the specialized nature of the work, it is recommended that the coating manufacturer be consulted before attempting to use aluminum paint on products of this type.

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Protective and Decorative Coatings for Railway Passenger Car Equipment

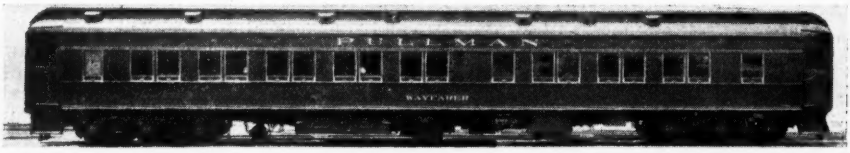
By Dr. A. M. Johnsen

Engineer of Tests and Chemist
The Pullman Company, Pullman, Illinois

IN PRESENTING the subject on railway passenger car painting, it is done so with an open mind as to the possibilities of the newer types of finishes that have been developed in recent years, and in which distinct technical adjustment is evident. The following remarks should in no way be interpreted as involving any question in this regard, and it is with genuine conviction that such technical development will progress and in due time prove itself by actual experience, which after all is the true measure of the worth of any new material.

Perhaps in no other place in industry are the demands on paint quite comparable to that put on railway passenger car coatings by reason of the service conditions in railway operations. A railway passenger car is out of doors all the year 'round, subject to all weather conditions. The coatings are frequently, in a brief space of time, subjected to wide ranges in climatic conditions, as for illustration in the instance of a through route travel from northern points where extreme weather conditions may prevail to extreme southern points where opposite weather conditions exist. Likewise in transcontinental service going across the hot deserts and next passing through mountain snow, the cars are subjected to the alkali dust of the desert and the salt sprays of the ocean. The outside coatings are subjected to the acid gases formed from the locomotive smoke which envelopes the cars, and continuously while in operation to the blasting action of cinders and sand. A dirt film gradually bakes on the surface of the car. This is a tenacious covering which periodically must be removed by strong cleaning. The painted surface must withstand all these conditions and still present a good appearance for at least two years of service operation which, in the instance of sleeping cars on some lines, is upwards of 360,000 miles for the period.

Herewith is presented a brief outline of actual experience and the most satisfactory solution of the above severe service conditions. New and improved materials and products are con-



tinuously being sought for. On Pullman cars an oleo-resinous type of material is used. Experiments have been carried out, by way of laboratory and car trials, with such coatings as pyroxylin lacquers, synthetic resin products and enamels, and while such test investigations are continued, the following is a list of problems that have been encountered:

1. Lacquer which gives remarkable service on automobiles has been found to chip off in spots such as corner posts, vestibule ends, rivets, and projecting parts subjected to the most severe contact with road ballast. Also lettering and decorations wear off somewhat rapidly and these conditions introduce a maintenance difficulty.

2. Enamels produce very satisfactory finishes, but thus far have not been found as desirable as varnish, due to the fact that they do not give the protection to lettering and decorations that can be obtained from a clear varnish coat over the color, and a varnished surface is more easily cleaned.

3. Varnishes made with synthetic resin materials give good finishes, but so far have not demonstrated sufficient superiority to warrant general adoption. This statement, however, can apply to any of the other types of finishes still in their development stage for railway service.

Paint operations on a steel car commence early in its construction. All connecting and overlapping joints must be treated in order to protect later inaccessible parts from corrosion during the life of the car. For this treatment, a liberal application of red lead and the better grades of iron oxides are used. All subsequent closed-in portions of the structure are treated with an approved metal preservative paint composed chiefly of lead, zinc, carbon and iron oxide pigments with pure linseed oil. This treatment adequately protects the structural interior for the life of the car. The enclosed sections, of course, do not have to weather the elements. They are, however, subject to condensation in some degree by reason of temperature difference existing between the interior and exterior of the car, although this is limited by the insulation material applied after the protective coating throughout the inner faces of both inside and outside sheets of the wall and roof construction. After all the exterior and interior sheets have been framed over the skeleton, the car is ready for painting.

Exterior Painting

The exterior is painted for the purpose of rust protection and to obtain a smooth, attractive finish. If the problem of preservation only were involved as in the instance of many types of structures, a great deal less material and labor would naturally be involved. Ten to twelve years is the average life of the exterior undercoats and from two to two and one-half years on the top finish coats. It is highly important that the initial paint treatment be such that it will best serve its continued maintenance. The success of any paint treatment is predicted on proper treatment of surface and the priming coat.

Ordinarily, hot-rolled plates are used for the exterior surface of the car, and sanding is an effective method for its preparation for paint in the removal of mill scale as well as foreign substances which come in contact with the surface in the shop. After the preparation, the entire surface has a clean silvery appearance with minute cavities which afford good anchorage for the paint. The rolled steel sheets that are used, while reasonably free from pits, waves and buckles, require treatment for surface irregularities for a smooth final finish. This is taken care of with putty and paint

surfacer and rubbed to a smooth finish. Since the car painting operations must fit in with the shop production schedule, the time available for painting is usually 30 days, consequently no forced drying or baking must be resorted to.

Paint Schedule—Exterior of Car

1st Day—Apply one coat primer.

4th Day—Apply coat of brushing surfacer.

5th Day—Putty and knife surfacer.

6th Day—Rub with brick and water.

8th Day—Re-putty and inspect.

9th Day—Sand and apply sealer color coat.

10th Day—Sand and apply body color varnish.

11th Day—Apply lettering, striping, and so on.

12th Day—Apply first coat of clear varnish.

14th Day—Apply final coat of clear varnish.

It will be noted that seven coats of material are required. From experience, this has proved to be about a profitable minimum for the class of steel employed. Two coats of surfacer are used in order to obtain a high degree of smoothness, and on these, two coats of color are required as the surfacer coats are highly pigmented. The first coat or sealer color coat strikes in where the remaining surfacer, after being rubbed, is heaviest due to the absorption by the surfacer material. From a purely protective standpoint, three of these coats, namely, the two surfacer and sealer color coats, are not necessary.

The service life of the type of varnish used in railway service is about 30 months, that is, not to a point of complete destruction, but after this period the revarnishing is necessary for the sake of appearance. It is normal practice to shop cars every 24 to 30 months, at which time the varnish is thoroughly scrubbed, sanded and a new coat of body color varnish and two coats of clear varnish applied. These refinishing operations are repeated for approximately 10 to 12 years, after which period the accumulation is such as to warrant a complete removal of paint film down to the steel. From a protective standpoint, it can be readily seen that the periodi-

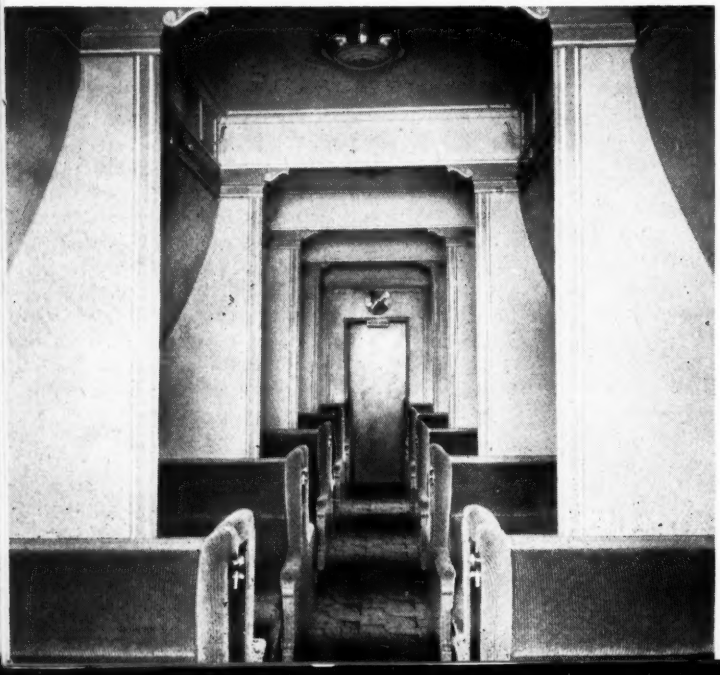


Fig. 1—A view of the interior of a general service Pullman car. This interior is finished in delicate colors of light shades.

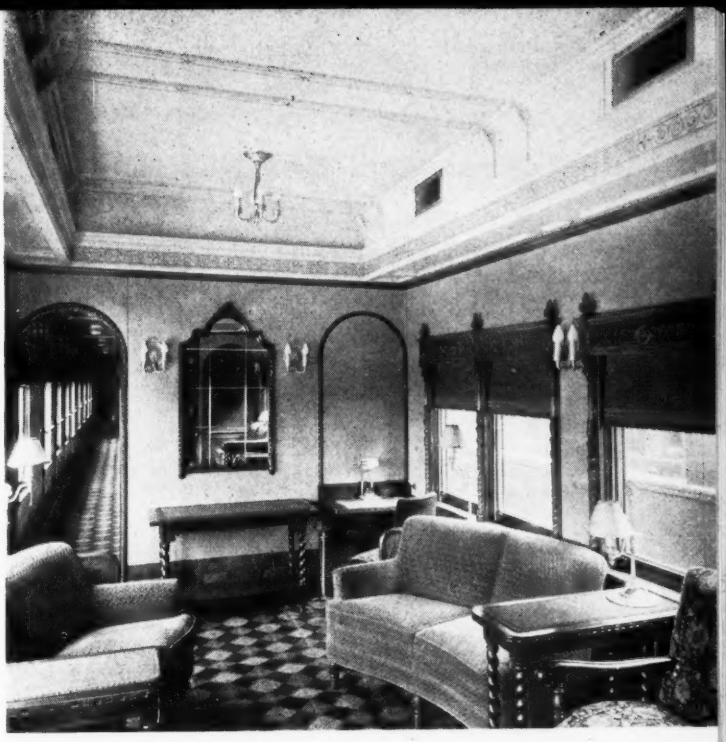


Fig. 2—Interior view of the lounge of a Pullman car. The light colored decorations blend well with the interior furnishings.

cal application of color and varnish gives continuous adequate protection to the steel structure.

Interior Painting

In the treatment of car interiors the designs and colors of contemporary styles are followed. The principal pigments used on the interior finishes are titanium and zinc pigments and the liquids are treated oils and varnish. The more delicate colors and lighter shades are quite popular. Grain finishes in imitation wood were very popular for years and are still employed to some extent, but the tendency is toward plain and more delicate colors and away from surplus decorations. The construction material for the interior of Pullman cars is cold-rolled steel sheets, stretcher leveled, and re-squared to specified size. In the mill fabrication, the scale on these sheets is removed by pickling and subsequent cold rolling imparts a smooth, uniform surface. The grade of sheet steel must be free from imperfections on one side and this side is exposed to the interior of the car.

The sheets used on the interiors are oiled before shipment to protect them from rust in transit and storage. When these sheets are ready to be applied to the cars they are first thoroughly cleaned with petroleum spirits, and sprayed on the back side with a coat of metal preservative paint. When later applied to the car, the whole interior finish is sanded to remove the highly polished surface of the cold-rolled sheets. A coat of exterior primer is then applied to the sheets.

Paint Schedule—Interior of Car

1st Day—Apply one coat primer.

4th Day—Apply first coat ground color.

5th Day—Putty where necessary.

6th Day—Sand.

7th Day—Apply second coat ground color.

8th Day—Apply third coat ground color.

9th Day—Apply first coat of clear varnish.

10th Day—Apply ornamentation.

11th Day—Apply second coat of clear varnish.

13th Day—Apply third coat of clear varnish.

16th Day—Rub to desired finish with pumice.

If the interior finish is to be grained to match a wood finish, an additional day is allowed for graining applied over the last ground color coat. Subsequent treatment is the same. The practice of specific treatment for the maintenance of interior paint is governed by conditions as found and local treatment is applied for sections accordingly, when and where as required. This work can be described as spot priming, puttying and cut-in with color and varnish. The men doing this type of work are highly skilled in matching so that local treated areas may not be detected. When necessary, the whole interior finish is sanded down, newly colored and ornamented and revarnished.

Miscellaneous Painting

Other parts of the car require no special decorative coating and these coatings are fundamentally for protection purposes only. In the instance of roofs, galvanized steel is employed since considerable protection is obtained from the zinc coating, and therefore, limited paint protection is required. By limiting pigment content in a long-oil primer, which is composed chiefly of linseed oil with a small percentage of red lead, the primer flows into the minute cavities produced in the surface of the zinc, and gives very good anchorage for the paint. Red lead is desirable for the pigment because of its basic nature. Over the primer, a finish coat of the same type of paint is used with the exception of an addition of carbon black which gives the desired black finish to the roof.

On underframes, two coats of metal preservative paint are applied over which is painted one coat of an asphalt-asbestos mixture.

While the foregoing represents a briefly outlined Pullman paint practice, that practice is fairly representative of average paint practice of the railways, although on exteriors, some roads prefer flat Japan colors in preference to full varnish color. Enamel finishes are used to some extent without the extra application of varnish. Lacquer is being employed to some extent. As previously stated, it has been found to be better practice to apply varnish as a finishing coat for both exterior and interior.

Paint Materials

The paint materials entering into the railway car paint systems cover a wide range of pigments and liquids. Some coatings are covered by specification and others are preferably handled as approved and tested coatings. The latter coatings apply more especially to those making up the exterior system, and these coatings are selected on the basis of suitability and cost. They are difficult to cover by specifications due to the fact that many of them have blended liquids, and so formulated with reference to other coatings comprising the system that it has been found advisable to control such materials as a complete unit comprising the entire paint system. Specifications, however, are always employed where they can be suitably prescribed and controlled on a strictly equitable basis. A coating, by way of illustration, that is impractical to cover by specification on composition is the Pullman body color. This color can cause considerable difficulty in the paint shop unless accurately formulated and carefully controlled by the color manufacturer, and consequently he requires latitude in the selection and preparation of its raw materials.

Pullman body color is formulated by an admixture of four or five colors which have been carefully selected as to shade and physical characteristics, and unless carefully compounded there

is sufficient separation of component colors when brushed out over the car to produce a streaked appearance, a condition encountered occasionally by all car painters. The condition is more pronounced where the brush splits over projections in the surface such as rivets and overlapping of plates. The color, therefore, requires very careful and uniform application to produce a solid effect. Shades of this color vary considerably unless held to a master sample.

Railway car paint materials continue to be made chiefly of oleo-resinous liquids, and the newer synthetic resins are being tried in various coatings. Lacquers are used by some roads but are not in general use for railway car finishing.

"Fostoria Handbook ML6." This is the title of a 16-page handbook which is now being issued by The Fostoria Pressed Steel Corporation, Fostoria, Ohio. There is said to be a Fostoria Localite for practically any operation in industry where a relatively high level of supplementary illumination is desired. The flexible arm units are adaptable to a wide variety of adjustments and positions without resorting to the use of wrenches, wing nuts, clamps, and so on. The indirect Canopy type units are said to provide a high level of glareless illumination over a wide area and accordingly, are adaptable for many lighting installations. Copy of Handbook ML6 free upon request.

Binks Spray Equipment Catalog. The Binks Manufacturing Company, 3114 Carroll Ave., Chicago, Ill., has just announced the publication of a new complete 60-page catalog covering their entire line of spray painting and finishing equipment. Spray guns, pressure painting outfits, spray booths, air compressors, pressure material tanks, hose and connections, respirators and masks, air and paint regulators, oil and water extractors, water wash equipment, exhaust fans, paint circulating systems, and all accessory spray painting and finishing equipment are fully described. Copy free upon request.

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The Development of the Modern Spray Gun

By C. S. Fisher

Vice-President and Chief Engineer,
Saylor-Beall Mfg. Co., Detroit, Mich.

THE earliest effort to secure the obvious advantage of the spray method of applying various liquids as coatings to different types of surfaces made use of a very simple device for atomizing the paint or other material

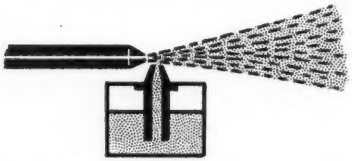

Fig. 1—A diagram illustrating one of the simplest principles of atomization. The paint is represented by small dots and the air by broken lines.

after leaving the nozzle. Air under pressure was projected over the open end of a tube, the other end of which was submerged in the material to be sprayed. The air, passing over the end of the tube, produced a slight vacuum in the tube. This vacuum raised the material in the tube. When the material reached the top, it was atomized by the air blast and was projected onto the surface to be sprayed. Fundamentally, the atomizing operation appeared as diagrammatically shown in Fig. 1.

The first improvement in this method of atomizing liquid materials was a gun in which the material was projected from the nozzle, surrounded by an envelope of air under pressure. This tube of air, traveling as close to the stream of material as was possible, mixed with the material after it left the gun, and atomized it. The process with this type of nozzle appeared as shown in Fig. 2.

The pattern made by such a spray was round, as shown in Fig. 3, and its size of course increased as the distance from gun to sprayed surface increased. This round pattern was satisfactory for coating small objects but would not produce an even coat of material on large flat surfaces.

Extensive tests have proven that the ideal pattern of spray, from the standpoints of speed of application and smoothness of finish, is elliptical. The long axis of the ellipse should be many times as great as the short axis, as shown in Fig. 4.

When spraying flat surfaces, the tapered ends of the ellipse patterns are overlapped as the gun is swung in a straight line across the work. This produces a uniform coating with a minimum of overlap similar to that

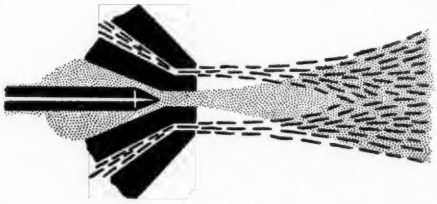

Fig. 2—In this nozzle, a jet of air travels as close to the stream of material as possible and mixes with the material after it leaves the gun.

shown in Fig. 5.

When this principle was first fully appreciated, gun manufacturers provided for this oval pattern through the use of two auxiliary converging blasts of air. These strike the atomizing stream from opposite sides and at an angle. The effect is to change the natural round pattern into an oval pattern and also to assist in the atomization of the material. The amount of change in shape depends upon the relative strength of the various streams of air and material. They issue from the gun as shown in Fig. 6.

That this development in gun design did not produce a perfect spray

Fig. 3—This is the type of pattern made by the spray from the nozzle illustrated in Fig. 2.

Fig. 4—Extensive tests have proven that the ideal pattern of spray, from the standpoints of speed of application and smoothness of finish, is elliptical as shown here.

is indicated by the fact that subsequently over 500 patents were issued covering improvements in the above design.

The chief difficulty encountered was in securing a proper balance in the size and strength of the several streams. A gun producing complete atomization under certain conditions would be found to be out of adjustment for certain other conditions. The degree of atomization is of course effected by the viscosity and speed of drying of the material, pressure of air at the nozzle or side ports, sizes of various orifices and angle of con-

Fig. 5—When spraying flat surfaces, the tapered ends of the ellipse patterns are overlapped as shown in this illustration.

verging air blasts from the side ports. If the auxiliary side blasts were too strong, the ideal ellipse pattern was

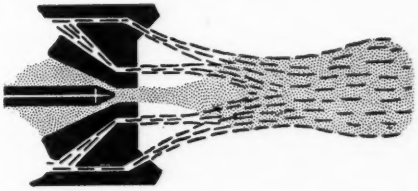

Fig. 6—Two auxiliary converging blasts of air which strike the atomizing stream from opposite ends at an angle are used in this nozzle.

distorted into a dumbbell pattern like that shown in Fig. 7, and uniform coating was impossible. Streaks were revealed in the finished work.

To overcome this condition, many spray gun manufacturers have increased the number of auxiliary ports. These have been directed so as to assist in the atomization and to soften or spread the effect of the side blasts. They operated similar to that shown in Fig. 8.

These nozzles have improved the finish and increased the coverage, but have increased the amount of compressed air required. Maintenance of the guns has been made more difficult because the additional side ports are generally quite small and difficult to keep from clogging.

Fig. 7—When the auxiliary side blasts illustrated in Fig. 6 were too strong, the ideal ellipse pattern was distorted into a dumbbell pattern as shown herewith.

The most recent improvement in design in external atomizing spray guns —and it is a very important one— produces the effect of complete atomization and flat elliptical pattern without a multiplicity of side ports and without any increase in air consump-

tion. There are only two side ports. Air issuing from these slides off the two baffles, which soften and spread

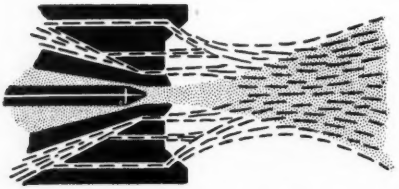

Fig. 8—To overcome the distorted pattern illustrated in Fig. 7, the number of auxiliary ports have been increased until the nozzle appears like the illustration herewith.

the air blasts to effect atomization similar to that shown in Fig. 9.

The baffles are integral parts of the air nozzle. The side ports are large enough to eliminate clogging. The baffles themselves tend to protect these side ports from flying particles

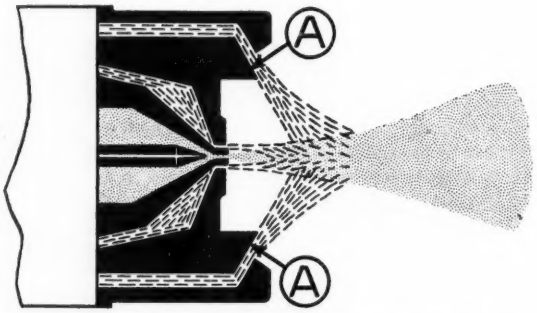

Fig. 9—Air issuing from the two side ports of the nozzle illustrated herewith slides off the two baffles AA. These baffles tend to soften and spread the air blasts to effect atomization similar to that as shown.

of pigment that may become separated from the material stream. The entire design is extremely simple, reducing wear on all parts, making adjustment easy, eliminating costly replacements.

"Swendeman Automatic Separator." This is the title of a 16 page booklet describing an automatic device that is said to eliminate oil and water from compressed air lines, which is now being issued by The Leavitt Machine Company, Orange, Mass. In practically all air uses, it is desirable that the air be clean and free from moisture and oil, and in a great many uses it is essential. Air operated tools, machines and devices cannot operate efficiently if the air is filled with dirt and scale, water and oil; and neither can satisfactory results be obtained in any kind of spraying or cleaning if the air is used in such a condition. The use of Swendeman Automatic Separators is said to lower maintenance costs in the operation of pneumatic tools and machines through better production and improving quality and eliminating rejects. A copy of this booklet in which specifications and suggestions for installation are contained free upon request.

"Hanson-Van Winkle-Munning Co. Bulletin BC-104." This is the title of a 20 page catalog which is being issued by the Hanson-Van Winkle-Munning Company, Matawan, N. J., in which buffs and compositions for practically every buffing need are illustrated and described. According to this catalog, buffing in general is divided into two operations known in the trade as "cutting down," which means the removal of major defects from the surface of the piece being buffed, and "coloring," which means producing a high final lustre. To perform these operations, two kinds of buffs are used: full disc buffs and pieced buffs.

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Barrel Finishing of Metal Products

Tenth Article of Series—Factors in the Selection of Barrels for Cutting Down and Grinding

By H. Leroy Beaver

RUMBLING, Tumbling, and Burnishing are not synonymous terms because our present understanding of processes carried out in barrels readily separates them as follows:

Rumbling—Indicates an operation in foundry practice for rough working generally in slotted barrels, boxes, and so on, mounted on trunnions. Some are operated wet with cinders or some other scouring agent, others dry with stars, broken wheels, and so on, while still other types are a combination of rumbling and sand blasting. Their purpose is for the removal of fins, sprues, and partings, and also for shaking core material out of the castings.

Tumbling—This is an operation often confused with burnishing and in many plants a pure burnishing operation is spoken of as "tumbling" while in other plants an identical operation is described as "burnishing", but our present understanding places the terms "cutting down" and "grinding" under this classification.

Burnishing—This term we have previously defined.

In this paper we have elected to discuss the operation generally known in the average shop as Tumbling, and indicating the removal of a part of the surface of the articles in work, and the instrumentalities required for the carrying out of the process.

We cannot judge from the size of a factory what its mechanical equipment requirements might be because we know of small factories whose production of small parts is such that the largest type of equipment is required, and again, very large plants where only a minimum of small parts are processed. Therefore, in discussing barrel requirements it will be understood that we have in mind average equipment for what we would nominally designate as an average manufacturing establishment.

In such an average establishment we will most surely find one of three types of barrels used for cutting down and grinding work. First, the Oblique Tilting Type Tumbling Barrel; next, the High and Narrow Abbott Type Barrel, and finally, the Long and Narrow Baird Type Barrel. While all three types are used, the favored ones seem to lean toward the oblique tilting type and the high and narrow type, the tilting type for lighter parts because of its flexibility of operation and the high and narrow type for heavier work where greater load concentrations are required. All of these types are also used for burnishing. We have previously described in detail the various factors that enter into the carrying out of the burnishing process. Simply described, there is no difference whatever in the application of the underlying principles of barrel burnishing for securing a high

lustre finish and cutting down for securing a smooth dull finish or even surface save that in the latter operation any one of a dozen to a hundred various types and combinations of abrasives and/or chemicals are used.

Some operators, and it seems to us entirely too many operators, seem to feel that cutting down or grinding cannot be successfully accomplished unless the load of parts and abrasive mass are violently tumbled about in the barrel, whatever the type. Indeed, one barrel manufacturer in his literature speaks of the "peening" effect secured in their barrels and "peening" of surface, so called, can only be secured by too high a barrel speed, where the parts are thrown against the sides of the barrel when the mass spills over at the top of the periphery of the barrel, or drops from that point back into the mass.

The relation of specific gravity of the parts to be operated upon and of the grinding mass is present just exactly as it is in burnishing with steel material and soap solution for securing a high lustre finish. In many instances simply the parts and abrasive material are operated together, either wet or dry, and again, soft balls, punchings, malleable scrap or broken abrasive wheels are included in the general mass. We have observed in several cases where such broken wheels were used that the specific gravity position was reversed and the broken wheel parts instead of blending with the mass, were, due to their lighter gravity, forced to the top of the mass where they floated, and of course their efficiency as a grinding medium was of doubtful value.

Referring now more particularly to the oblique tilting type of barrel, the major portion of them is of cast iron, but a later development uses a sheet steel barrel generally of ¼ in. steel boiler plate and lined with soft rubber. For parts that are what we would term fairly uniform these soft rubber-lined barrels represent a remarkable advance over the cast iron type, but specifically they cannot be used on stampings having sharp burrs. Now in order to get what we might term maximum figures, we give the following data taken from actual working conditions. In this instance the barrels were first of cast iron, 20 in. mouth, 30 in. base and 24 in. length, with a thickness of ⅝ in. at the lip, tapering to 1 in. at the base of the sides and the bottom. Such a barrel will weigh about 750 lbs. and is operated with a load averaging 500 lbs. but for a period of over four years this type of barrel was operated on a three eight-hour shift program or 24 hours per day. On this schedule the life of the cast iron barrel shells was approximately six months. Now, instead of the cast iron barrels, they use a steel boiler plate shell barrel the weight of which is approximately 300 lbs., but instead of the original size of the cast iron shell, the barrel size was revised to bring it to the equivalent weight of the cast iron barrel, thus providing for larger load at no greater operating power cost. The rubber lining in these steel shells is soft vulcanized averaging ¼ in. at the lip of the barrel and tapering to ½ in. at the bottom. Still operating on the 24-hour schedule, the now larger rubber-lined barrel averages eighteen months or three times the life of the cast iron barrels, and when the rubber liner requires replacement the cost averages only about the cost of the steel shell alone, as no wear whatever is given the shell in the operating process.

Barrel operators have often asked the writer what he considers to be the best speeds at which oblique tilt-

ing barrels should be operated. Over a period of years we have periodically checked the speed of this type of barrel in many installations and in by far the major part of the cases checked, the speed ranged from 42 to 65 r.p.m. depending on the character of work being operated. A further question related to the best angle of tilt for this type of barrel and the same investigation discloses that the tilt is confined to the comparatively small range of from 37 to 46 degrees.

We should note, however, that the rubber-lined barrels just described cannot be operated with oil or chemicals combined with the abrasive, but with water and abrasive only. (Note: Names of manufacturers who can supply rubber liners for barrels can be supplied by PRODUCTS FINISHING.)

Now as to the high and narrow Abbott Type Barrel, without maple liners, which is largely used in cutting down and grinding operations, pretty much the same comment is applicable as to the pear shaped barrels. They should not be operated at too high speeds, nominally from 15 to 25 r.p.m., because we must always remember that the actual cutting down action is secured by pressure from within the mass against the parts passing through it, and not by tossing the parts through the air by too high a barrel speed. In purchasing this type of barrel, the larger diameter will of course provide the greatest length of foot travel of parts through the abrasive mass per revolution of the barrel and this is much to be desired. In order to provide sufficient weight, even though smaller quantities of fairly heavy parts are operated at each load, a 16x30 barrel is preferable and far more efficient than an 8x30, and the only increase in cost would be the intermediate barrel shell as the same end plates, shafts, and so on, are used. Generally one pair of ends will outwear two to three sets of centre peripheral shells, and for this reason we would advocate the purchase of this type of construction, rather than a solid shell type or barrels where the castings are made in two parts and then bolted together at the centre of the periphery of the barrel.

The Baird long and narrow type barrels have a wide application, for in many plants where nominal quantities of small parts are handled, the barrels are bought in double type machines, one barrel being used as a cutting down or grinding barrel, and the other with maple liner as a burnishing barrel. They are admirably adapted for work on small parts and in small quantities and also for parts where not too great pressure is permissible. In this type, the diameter being small and the length being several times the diameter, the load is more lightly and evenly distributed. The Baird Double Machines are admirably designed and require only a minimum of installation space.

The three types described above are the generally accepted ones for average plant installation and enjoy the widest popularity.

There are, of course, other modifications of barrels ranging all the way from modified concrete mixers to double oscillators and conical ended barrels. Oscillating types have been largely abandoned, and the objection to a barrel with conical end members is that it can only be operated efficiently when the entire load of parts and abrasive material is at or slightly below the centre of the axis of the barrel. If such a barrel is operated at conventional two-thirds full load, the tendency is for the main load moving around the periphery of the barrel to jam that part of the load which projects outward into the coni-

cal ends, where the motion of that part of the mass would be almost inert. Straight-sided barrels are much to be preferred to any other type for the reason that they provide for a far more even flow of the mass.

An examination of Patent Office records discloses many schemes for layouts of both barrels and barrel interiors, many of them fantastic to a large degree and most of them largely theoretical. Generally speaking, any design or instrumentality in connection with burnishing or cutting down operations other than the normal six, eight, twelve or sixteen-sided paneling of the periphery of the barrel, such as pie shaped side walls, ribbed liners, round ends, conical ends, convex ends, and so on, that tend to impede the even and normal flow of the mass, whether in burnishing or cutting down operations, is not as desirable as the action that is secured in a normal pear-shaped or oblique tilting barrel or the high and narrow or long and narrow types. For many applications, there is no barrel so satisfactory as the oblique tilting type, particularly where small quantities of light gauge parts are operated. As a general thing, finer finishes can be secured on light loads of light gauge types of parts than on heavy loads of heavy gauge parts or castings. Within quite a wide range, distortion of light gauge parts is avoided in the oblique tilting type of barrels, because in this method of operation the parts are not confined and when the pressure upon them becomes too great, the parts will work forward toward the mouth of the barrel.

In cutting down operations on parts that are to be subsequently plated, loads of more than 500 lbs. maximum are not recommended, because if mixed grit or grain of abrasive is used, the greater pressure exerted by the heavier load may have a tendency

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to cut deep scratches on the parts which are not so easily removed unless it be by longer operation or else a change in abrasive load to a finer grit or grain.

When we speak of tumbling or cutting down or grinding, which is the intent of this paper, we naturally have in mind castings rather than stampings, and we would also distinguish in castings that class which is to be subsequently plated as contrasted with castings that are simply to be painted, sprayed, galvanized or enameled. Parts in the latter class, when as castings they are ground down to a smooth finish, generally come more properly within the scope of operations covered by foundry practice, where barrels of up to 60-in. diameter are not uncommon, and where also sand blast, steel grit blast or exhaust barrels are used. While the writer is familiar with this type of equipment, he does not feel that it comes within the scope of this series of papers.

In the range of barrels used for cutting down work and dry polishing, we may not omit mention of the old friction type of driven barrels that are still in active service in many parts of the country. These are generally operated in gangs of from six to twelve operated on a double shaft line with friction wheels whereon the barrels rest. In this classification we find the "baby" of them all. This barrel is a bit difficult to describe. In general appearance it resembles nothing so much as a squat type of milk can laid over on its side. Its periphery is round instead of polygonal or hexagonal and to provide break-up in the mass the periphery is studded with pins which project downward inside of the barrel. While there would be literally hundreds of applications for barrels of this type, we know of no manufacturer at present supplying them, and they are generally built in the plants where they are used. Indeed, they seem to predominate in one single industry and that is in the manufacture of pen points. Here we have a most exacting application that ordinary commercial types of barrels cannot supply, for the gauge of the material operated on irrespective of the metal used, is very light and the points of the pens very delicate, yet millions of them are produced daily.

In cases where large quantities of very light gauge parts are barrel processed such as eyelets, grommets, small metal trimmings, and so on, the friction drive type, once thought to be practically obsolete, has a very real and perfectly sound application in present day light gauge metal finishing practice. Light in weight, they may be operated in gangs of six to twelve on one drive, and any barrel in the line may be lifted off the friction wheels at will, the contents checked, or the barrel loaded or emptied without disturbing any of the other barrels in the train. Continuous operation is secured by having additional barrels on hand, and while one lot is finishing, a loaded barrel is readied for setting on the driving wheels.

Cutting down and grinding operations are conducted both by the wet and dry methods. Here we would insert a word of caution to operators of dry grinding barrels, whether of the oblique tilting or high and narrow type. In some establishments smoking is permitted in the burnishing department, and this is especially so in the individually operated or what we might term "one-man" establishments. Dry barrel operations invariably develop dust and the greatest care should be exercised in lighting matches near the openings of the barrels when in operation. I cite an actual happening to a friend of mine

who has operated barrels for years, and who inadvertently lighted a match at the barrel opening. He recalls a blast not unlike that of a trench mortar and he and an assistant were then traveling hospitalward. Dust is, when floating in the air in too great a concentration, a violent explosive and this is true whether the dust is metallic or from fibrous material.

When we come to the consideration of the various abrasives and abrasive materials and chemical combinations used in cutting down and grinding operations, we literally "run the gamut" of everything abrasive in character. There are more "best" combinations than the proverbial millions of fleas on a dog. Different sections of the country entertain different ideas. Everything, almost, has been tried and in most cases recommended from the neighbors sand bank to the heap of cinders in the factory's own back yard. Much of this is pure makeshift operation, and in many instances with which we have had personal contact, the situation has often developed where an operator was literally standing in his own way so far as results were concerned. The back yard sand bank may be well enough, but if this type of abrasive requires three days to accomplish a result that a manufactured abrasive will accomplish in one day, it really could be termed a doubtful economy.

In the case of castings so many things must be considered prior to the actual cutting down or grinding operation in the barrel, that we should once more call attention to the kind and character of sand used for molding, the character of the mix, the manner in which the sand is sifted after each use, the condition of patterns and flasks and the skill of the moulder all of which are precedent to the barrel operations.

When castings come from the foundry, it is most certainly not enough to simply snag off sprues, gates and ridges or imperfections with a coarse wheel. A better practice is to use a double wheel stand with a coarse wheel on one side for snagging, and on the other side a finer wheel with a grit or grain comparable to the grit or grain of the abrasive used in the barrel. Personally, we lean toward and favor the use, even though their first cost is greater, of the general line of abrasives coming under the general head of Silicon Carbide and

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Aluminum Oxide for both cutting down and grinding. Some of the best applications with which we have come in contact have been handled in the manner just above described. The snags are removed with a coarse wheel, then the parts are worked on the second wheel to close the surface and then when the parts are placed in the barrel, the same grit or grain of abrasive is used as that on the second wheel operation. In this manner of working it will be seldom that deep scratches will be found and the surfaces are generally uniform.

We have all read papers and heard discussions both by technicians of abrasive manufacturing companies and independent research engineers on the importance of maintaining uniformity of grain and to avoid the mixing of various grits and grains in setting up wheels. Now if this phase of abrasive operating technique is so important in setting up a wheel, why is it not equally as important to maintain uniform grit and grain in a barrel grinding and cutting down operation? It must be remembered that by this barrel process we are seeking to overcome individual handling of the parts by an all-over surface grinding by using the human element for simply removing such parts of the surface as the inanimate barrel itself cannot elect and choose to do. Surely, if the human and intelligent element in the production factor is entitled to uniform grit and grain, then the wholly inanimate barrel should have at least an equal consideration in the metal finishing plan. Here again we are referring particularly to castings that are to be subsequently barrel burnished and plated.

The objection to the general use of the Silicon Carbide and Aluminum Oxide line of abrasives is almost invariably directed at the higher cost of this material as compared with the makeshift abrasives previously referred to. This objection is not always warranted and the following comment may be found useful to many readers of PRODUCTS FINISHING who are operators of the types of barrels and the operations discussed. It seems to be the general practice to unload and discard the abrasive solution after the completion of each load of work is removed from the barrel, where as a matter of fact there are many cases where the work has been properly prepared, or where the operations succeeding one another in the course of production of the parts have been such that just a touch is required to produce uniformity of surface, that one charge of abrasive material will suffice for two, three or more loads of work. We have often seen intelligent and understanding barrel operators "feel" the abrasive solution after a load of work has been completed to determine just how much "cut" is present in the abrasive, and if it is still sufficiently sharp, instead of dumping the solution down the drain, the parts that have been finished are raked from the barrel and another lot loaded and processed. Then again we have seen operators who required a sharp cut on a certain part which when completed still left plenty of life in the abrasive solution but not enough to start another lot of the same kind of parts. This solution can be poured from the barrel into a drum, the abrasives will settle and the water can then be syphoned off and the abrasive used on parts that require less of a cutting operation. If barrel operators will give a little intelligent thought to such suggestions, they may find that the manufactured abrasives when properly used and all of their cutting properties realized in actual work, will be little if any more expensive than the

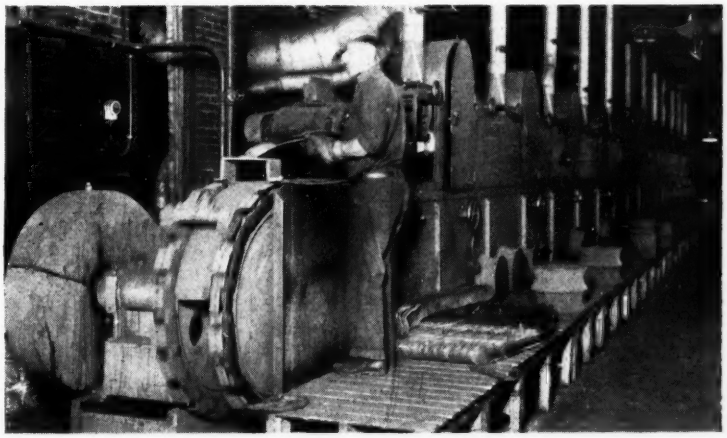
ordinary or garden variety of abrasives used in barrels.

Readers of this series of papers will note that we do not and have not in the series, given any formulas of proportions of the various materials to use on given operations. The reason for this is that what might be applicable and function entirely satisfactorily in Connecticut would be altogether inapplicable in Illinois. If you have a problem and care to state it to PRODUCTS FINISHING, you have our assurance that we will do all that we can to assist you in its solution.

Fairbanks-Morse Bulletin 3600-A2. This bulletin which describes and illustrates the construction and application of Fairbanks-Morse Model 36-A Diesel generating sets is now being issued by the Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Illinois.

These sets are widely used in industrial plants, either as independent units carrying the entire load or for parallel or auxiliary operation in conjunction with other electrical service. Their compact design fits them for service on machines requiring individual power plants, such as electrically operated shovels and dredges, and they are readily adaptable as portable and semi-portable electric power plants on construction work, in lumber camps, and so on. Because of their construction with a substantial common sub-base, they may be installed on simple foundations, making them especially suitable as marine auxiliaries.

True Diesel economy and dependability are available in the F-M Model 36-A sets. They represent an outstanding development in the design and construction of unit-built generating plants in comparatively small capacities. They are compact, are easily installed, and can be operated with little attention. Alternating current sets are offered in ratings from 5.3 to 100 kva. and direct current sets from 5 to 80 kw. Copy free upon request.



Automatic bumper polishing machine. This is a twelve-wheel unit which was designed by Divine Brothers.

Unfortunately, in the article on Buckeye Bumpers in the October issue of this magazine, the captions under Figures 2 and 3 were transposed making it appear that the automatic polishing machine with which a "buggy" was used is a product of the Divine Brothers Company. The fact is the automatic polishing machine made by this firm does not employ buggies. Instead, fixtures are used as shown in the illustration which was indicated as Figure 3. This illustration, showing the machine in operation, is reproduced here with the correct caption.

Black Edging Problems

By H. G. Wolfram

Works Manager, Porcelain Enamel and Manufacturing Company

BLACK edging has become a very necessary part of enameling practice. At one time this procedure was not used or demanded, partially because it had not been thought of and partially because the ware was acceptable as the enameler made it. We do not know how much ware from Mexico or South Africa comes into this country, but a great deal of it, which we have seen, is made very much as it used to be in this country and has only the ground coat as edging. We enamelers have brought the edging problems on ourselves and, while the method makes for troubles occasionally, we must admit that a black edge sets off a piece of white just as a picture frame beautifies a picture. Naturally, this extra coating costs extra money to produce and just as naturally we try to cut these costs to the bone.

Originally, we attempted to patch ground coat edges or bead with a black enamel so they wouldn't look so ragged. This was done by hand or with a paint brush, usually after the second white was applied, but before firing so that the two could be fired together. The products were crude but still better to look at than the old ground coat edges. This method caused much rework, due to the excessive handling of the bisque white. Therefore, with the advent of the spray gun, it was decided to edge the ground coat after firing and refire. This method was proven to be the most satisfactory method but costly. Naturally, the application to the unfired ground coat bisques saves the cost of one fire and is the method most used today, even though troubles are encountered at times.

Edging was originally resorted to in order that losses from chipping, crazing and hairlines might be eliminated in the white enamel. Today it is a necessary decoration. But it has been found since that these defects still often occur and besides other hazards have been added, such as boiling through, pits, copperheads, blisters, pinholes, curling and off-shade ware. Naturally, when black edge works as it should and in most cases it will if prepared and applied correctly, there is considerable saving both in time and money.

Since very little hazard is connected with the application of black to the fired ground coat, we need not discuss it here. We shall attempt to discuss spraying over the bisque.

The black edge enamel should be milled at least as fine, if not a bit finer than the ground coat over which it is to be used. Some small control of softness can be exercised in this manner. Still further control can be had by more or less additions of either feldspar or silica at the mill, thus also controlling the firing range. Black oxide may or may not be added, depending upon the type of edging glass used. There are black edge frits on the market today which require no black oxide additions. The softness of the edging should be coordinated with the softness of the ground coat for various reasons, which may be discussed later.

It is quite essential that the black edge slip contain as little water as possible and be set at a thickness

which will produce a dry spray. Andrews, in his book entitled "Enamels", on page 281, speaks of black edging as follows:

"When applied over the dried ground coat, it is sprayed very dry to avoid rewetting the ground coat enamel. If too wet, it causes blistering. This method of applying black edging over the ground coat is satisfactory, if the ground coat is uniform and not too thick and if the black edging is applied dry and rather thin."

Practically all writers on the subject agree with Andrews' viewpoint. Wetting of the dried ground coat may cause excessive rusting of the steel and a chemical reaction between the enamel and this oxide during firing, resulting in a boiling which may produce either blisters or copperheads in the black edge, both of which are disastrous. Many companies, in order to insure dry spray or quick drying at all times, spray the black edge on the ware when hot, as it leaves the ground coat dryer. It then passes directly into a smaller dryer to further dry it. Some feel that when wetting the ground coat, the black oxide is driven through the ground coat closer to the metal and that the reaction between some of the ingredients of the black oxide and the ground coat due to thickness of layer, causes blisters to form, which will not heal.

Considering further Andrew's quotation, that the black should not be sprayed too thickly over too heavy a ground coat; normal procedure for application of ground coat is between 32gms. per square foot, and 42gms. per square foot dry, depending upon the type and kind of ware and steel. Normal application of black edging, as stated by several authorities, is between 10 and 15gms. dry per square foot. Many of us, no doubt, realize that 42gms. dry per square foot is too heavy for satisfactory ground

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coat and that 32gms. is the proper procedure. Yet, if we stop to think that after applying 32gms. of ground coat, we turn around and apply 10 to 15gms. more enamel, yes and plenty of times considerably more than this, on top, we have far exceeded what we normally accept as safe application of a single coating of any enamel. Blisters, pinholes, copperheads, shipping, crazing, hairlines or curling may occur and we wonder why.

Normal application of white one coat is 32gms. per sq. ft. — when two coats and two firings are applied. Also, we do not think of exceeding 45gms. per sq. ft., when attempting one coat, yet some of us apply 42gms. of ground coat and because only the edging gets the black, apply an additional 15 to 20gms. of black, a total of 65 to 70gms. per sq. ft., which must mature properly in the least possible time and temperature. This is emphasized not to ridicule but to impress the necessity for absolute control of all operations and a knowledge of weights of applications, in order to successfully black edge on the dry ground coat.

There is one shop with which we are familiar that applies ground coat from 22gms. per sq. ft. dry to a maximum of 28gms. per sq. ft.; and as long as we have known them, they have been free from black edge troubles. Any troubles which they have had to mar the black edge have been proven due to pickling procedure and not black edge. Such thin applications of ground coat require rigid control of the ground coat, and one can readily see that a heavier coating of black than 15 grams is not going to exceed what we all accept as safe weight application of an enamel coating. We do not recommend such a thin application unless a shop is prepared to spend some money on absolute control and, when we say absolute, we mean 24 hours a day, including Sundays and holidays, on all operations.

Not all troubles with black edge can be attributed to excessive weight of application. Spray manipulation, even with proper weight, may cause troubles. For example, high air pressure may force the black edge through and break the dry film of the ground coat, causing a roughening of the surface, curling and even blistering. Holding the gun too close to the ware may result in the same even with a lower air pressure, and we have mentioned above the danger of wet spray.

Black edge, which is much softer than the ground coat, will cause pitting and even copperheads on those portions of the ware not ordinarily sprayed but where the dust settles during the operation. Such defects most surely cause unsightly white, rework and rejects.

Rosenberg, at The Porcelain Enamel Institute Forum, at the University of Illinois, in a paper entitled "Black Edging Practice", stated as follows:

"Firing is a particular problem only when the black edge is applied over the unfired bisque. There are two factors which must be considered. One is that the piece must be given sufficient fire to mature not only a normal layer of ground coat but also the additional coating of black edge. Secondly, the fire must be prolonged enough so that the gas bubbles present in this relatively thick layer of ground coat and black edge will have an opportunity to flow out while still in the furnace."

Perhaps you have reinforced your ground coat by spraying with ground coat at certain points on the ware. A normal ground coat fire will leave these portions very much underfired; and curling, hairlines and boiling through may occur in the white fire. Such also is the case when reinforcing with black edge, although the im-

matured black edge cannot be recognized as such by its color as can ground coat. Nevertheless, neither the black nor the ground coat under it, are matured sufficiently to release enough gas bubbles to insure a perfect product.

A problem recently presented itself in the form of black edge blisters. Investigation showed that the ground coat mill formula had been changed so that ¼ per cent more borax had been added to the mill. When this was removed, the blistering disappeared. It is probable that the more addition of this small extra quantity of borax was not the basic cause of the trouble but that aging or increased temperature of the mill room and general atmosphere, caused quicker aging, bringing out the excess amount of salts, which caused the trouble either as poor set in the ground coat or black edge.

Dr. Strong, in the American Enameler, September 1935, in his paper entitled, "Temperature and the Black Edge Problem", summarizes his report as follows:

"The presence of excess alkali due to increased solution in warm weather in either ground coat or black edge may cause blistering in the black edge. The defect may be minimized by cooling of the enamels (both ground coat and black edge) during milling, in storage, and during application or in the case of enamels which have been stored in a warm place, by removal of the excess mill liquor."

In conclusion, black edge difficulties, such as chipping, crazing, hairlines and boiling through of the white, also pits, copperheads, blisters, pinholes and curling in the black edge itself, may be caused by one of the following:

1.—Heavy application of either or both the ground coat and black edge.

2.—Poor fit between ground and black with respect to softness and burning range.

3.—Excess alkali either in the ground coat or black edge, due to over addition in the mill or fast aging from an overheated condition.

4.—Wet spray.

5.—Thickness of ground coat and black edge.

6.—High air pressure and close up spraying.

7.—Underfiring.

8.—Poor set both of ground coat and black edge.

9.—Excess aging even when enamel is cool.

These do not constitute all of the defects one may encounter nor all of the causes.

Brown Pyrometer Catalog No. 1102. The Brown Instrument Company, Wayne & Roberts Aves., Philadelphia, Pa., is now issuing a catalog on Potentiometer Type Brown Pyrometers. This catalog covers the complete line of Brown Potentiometer Pyrometers—indicating, recording, and Controlling. It includes the new Brown Electr-o-Line Controllers and Brown Proportioning Control System. Potentiometer Records are supplied with three types of records. Continuous ink records, colored dot-circle records, and colored numeral records are clearly illustrated by chart sections, reproduced actual size. Copy free upon request.

Janette Bulletin 227. Janette "Precision Built" Generators, Motor Generators, Motorized Speed Reducers, Electric Motors, Blower Wheels, Motorized Blowers, Rotary Converters, and other equipment made by Janette Manufacturing Company, 556 W. Monroe St., Chicago, Ill., are described in Bulletin 227 which is now being issued by this firm. Copy free upon request.

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the FINISHING FORUM

Question: What is the proper burnishing material to use for removing the burrs from the inside of the oblong hole of brass parts of which we are sending you herewith a sample?

Answer: We doubt whether the answer to your problem lies in barrel burnishing. This is a cupped part and when such parts are placed in a barrel the cupped section almost immediately fills with burnishing material and the pressure from without the slot is greater than from within thus causing the burnishing material to lie practically inert. Our suggestion therefore is as follows:

First: In many cases such as this where a burr develops either in an oblong slot or round hole, and if the burr is light, it will be completely removed by a bright dipping in the customary bright dip for brass composed of equal parts of nitric and sulfuric acid with just a touch of muriatic. If this does not remove the drag then

Second: For an oblong or square opening, take gumwood from which orange or lemon crates are made, and for round holes regular wood dowel sticks (they can be had at any hardware store), cut them into lengths of 8 in. to 10 in. long, and have them small enough that they will easily enter the oblong or square slot or hole. These may be "set up" with FF pumice in the same manner as setting up a wheel. In this case the mixture should be one part of glue to three parts of water. One or two passes of such set up sticks will more effectually remove burrs of this character than any barrel operation.

Question: We have been using steel balls in a cream of tartar solution for burnishing but find that the balls are pitting and this scratches the work. We then went to soap and this gives us a darker finish than the original color of the brass, so we discontinued this and are now using a mixture in the solution of ————, Borax and Acid Sodium Pyrophosphate. This however leaves a dull scratched surface. What can we do about this?

Answer: We have repeatedly cautioned against the use of steel burnishing material with cream of tartar or its synthetic Acid Sodium Pyrophosphate. Either of these will most certainly pit the steel burnishing material. Your switch from soap chips to a combination of ————, Borax and Acid Sodium Pyrophosphate is a bit difficult to understand. The Trade Named product and the Borax are both highly alkaline and your Acid Sodium Pyrophosphate is acid, but in combining them you neutralize the acid with the alkali hence your burnishing operation becomes little more than a washing operation without lubrication hence the pitted burnishing material causes scratches. From the appearance of the samples you submitted I would suggest that you junk the load of burnishing material as it is past redemption. Secure a new lot of burnishing material and go back to your soap solution as before. The darkening of the brass from its original light color is due to oxidation caused by a chemical reaction within the barrel while in operation or the generation of heat by rapid revolution of the barrel. This oxida-

tion may be easily removed by simply dipping the parts into a solution composed of 4 ozs. of sodium cyanide to each gallon of water, which will restore the parts to their original color without harming the lustre. After this dip, rinse in hot water and dry in sawdust. Thanks for raising this question of oxidation because it has annoyed many barrel operators, and the solution as above suggested is effective in practically 100 per cent of cases.

Answered by H. Leroy Beaver.

Metalspray Bulletin 800. This bulletin, now being distributed by Metalspray Company, Inc., 115 Llewellyn St., Los Angeles, Calif., presents a variety of tasks which are accomplished by the use of the Metalspray to spray hot metal. The Metalspray is a spray gun through which brass, copper, lead or other metals are fed, atomized by a flame of intense heat, and sprayed by means of an air blast at the same time, thus making it possible to coat a surface with a thin layer of metal in much the same manner as lacquer or paint is sprayed with an air-operated spray gun.

Bulletin 800 describes and illustrates a variety of jobs in which the workpieces have been reclaimed by building up worn spots or sprayed with metals for protection against corrosion, wear, and so on. The illustrations show a 5-ft. seal ring for a 25,000 h.p. water turbine which has been reclaimed by building up the worn parts with sprayed brass, pump rods which have been reclaimed by spraying the worn areas with steel, cast iron Diesel engine pistons which have been reclaimed by building up with both low carbon steel and high carbon steel, a motor housing which is sprayed with aluminum to protect it against corrosive fumes, switch boxes which are sprayed with zinc for weather protection, reclaiming worn beater roll journals by spraying with high carbon steel, and so on. Copy of the bulletin free upon request.

"Coated Abrasive Products for All Purposes." This is the title of a 68-page booklet which is now being issued by The Carborundum Company, Niagara Falls, New York. Coated abrasives for automobile body finishing and metalworking industries are described in this booklet. The specifications for Electrocoated Aloxite Brand Aluminum Oxide Cloth are listed in tabular form. This type of cloth is furnished in all standard grits, from 320 to 24, in sheets, rolls, and economy rolls, for sanding and finishing metals.

For hand work a special Jeans cloth that is extremely flexible in both directions is provided. In the coarser grits a flexible X Drills is used for the backing.

Carborundum Brand Waterproof Papers, used principally in wet sanding of automobile bodies, both in the body manufacturing plant and in the repaint shops, are made with a special backing of high quality stock selected for its strength and extreme flexibility. The paper is thoroughly waterproofed on both sides and will not pulp in the operator's hand. These papers are made with three abrasives—Carborundum Brand Silicon Carbide, Aloxite Brand Aluminum Oxide and Carborundum Brand Garnet. This Waterproof Paper is made in three weights of backing—A, C and D and is supplied in 9 in. and 11 in. sheets, 480 to a ream.

A copy of "Coated Abrasive Products for All Purposes" which describes these abrasives in greater detail will be sent free upon request.

"Heating Corrosive Liquids Bulletin No. 42". This is the title of a 4-page bulletin dealing with methods of heating corrosive liquids in the various process industries which is now being issued by Heil & Company, 3086 West 106th St., Cleveland, Ohio. In addition to information on gas, steam, and electric tank-heating equipment, immersion-coils and so on, it contains diagrams of pipework connection details, graphs of heating speeds, and other useful data. Copy free upon request.

"Bristol Bulletin No. 461." This is the title of a bulletin on Synchro Diaphragm Control Valves which is now being issued by The Bristol Company, Waterbury, Conn. Information is given regarding the constructional features, the operating characteristics, and the various types of Bristol Synchro Diaphragm Valves and their application to typical installations, where temperature, pressure, liquid level, flow and humidity are controlled pneumatically. Data on sizes, dimensions, and valve metals are also included. Copy free upon request.

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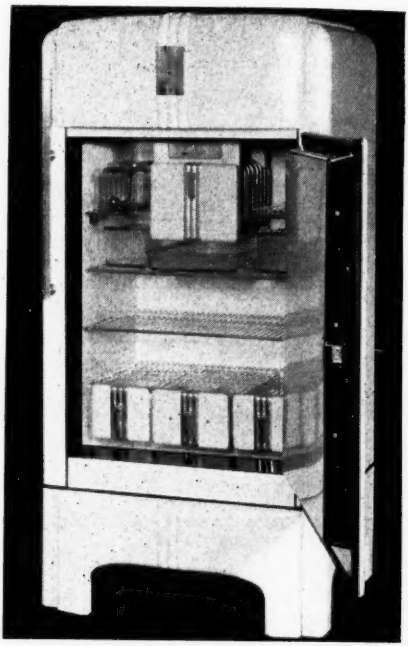
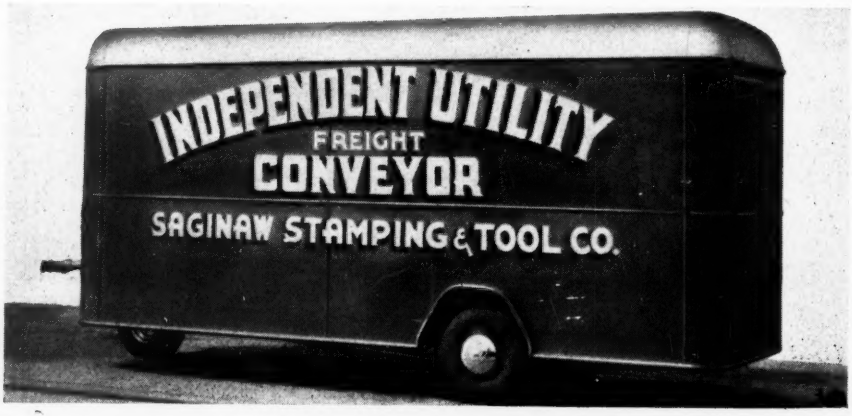
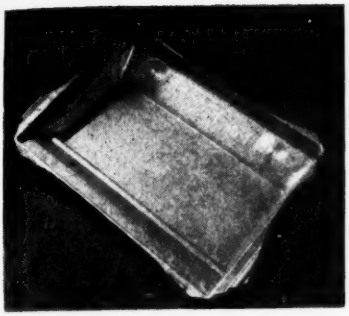


(Right)—One of the best examples of the value of adequate metal finish for specialized service is afforded by the modern refrigerator. The refrigerator shown herewith is finished in gleaming white porcelain enamel.

(Below)—The exterior of this three-wheel freight van is painted with a high grade lacquer. The location of the third wheel knee-action caster unit makes it liable to splashing and subsequent corrosion, consequently this part is subjected to a rust-proofing process.

(Photo Courtesy of Saginaw Stamping & Tool Co.)

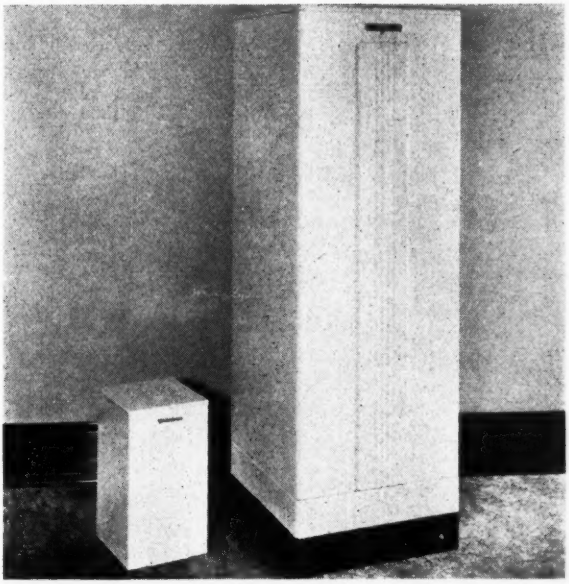




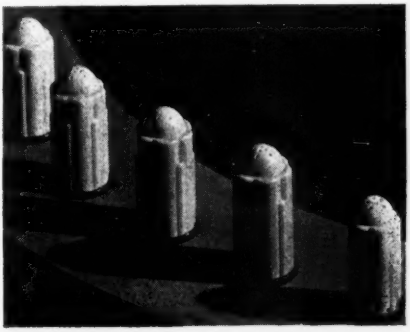
(Photo Courtesy of American Rolling Mill Company)

(Left)—A heavy coating of commercially pure zinc on this refrigerator watershed pan resists cracking and peeling even when drawn to a depth of five inches.

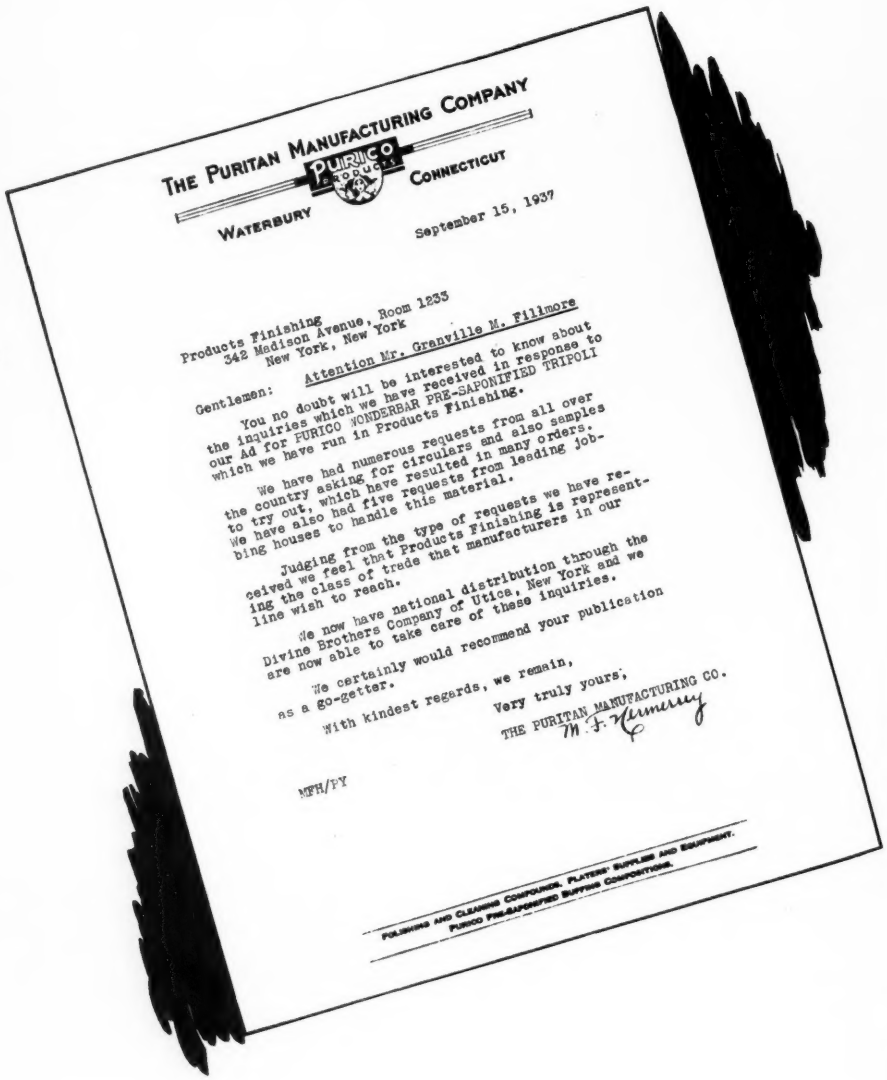
(Below)—Home hot water heaters with capacities of from one to thirty gallons have been made available by a well-known manufacturer. The two heaters shown herewith are finished in a high temperature white lacquer which is baked on the outer surface of the steel casing, over a thick primer coat. This finish has the appearance of porcelain enamel and is said to withstand chipping, cracking, and peeling.



(Photo Courtesy of Westinghouse Electric and Manufacturing Company)



(Right)—These plastic forms in combination with metal bases help to achieve a modern decorative effect. The metal may be finished to resemble plastics just as plastics may be finished to closely imitate metal.



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NEWS OF THE INDUSTRY

Electroplating Courses Offered By Correspondence

Dr. C. B. F. Young, who for the past three years has offered courses at Columbia University, New York City, is now offering a similar complete course in practical electroplating by correspondence. Those men outside of New York City who are unable to attend the classes at the University but desire to gain further knowledge may take similar courses by correspondence.

The complete course is divided into two divisions. The first deals with organic chemistry as it applies to the electroplater. It is designed to give a foundation in chemistry which is essential in the study of electroplating. Each division is divided into twelve lessons and each lesson consists of a lecture and a set of laboratory experiments. The student, after reading over the text and lecture, performs the laboratory experiments with the aid of a complete laboratory set consisting of all necessary chemicals, glassware, and apparatus, which is supplied with each course. After completing the study of each lesson, a written report is made and sent to the instructor. This will be corrected and returned to the student. The first division is also furnished with notebooks, textbooks, writing paper, and envelopes. The first course or its equivalent must precede the second course.

The second part of the course is written so as to give the practical electroplater the latest methods of obtaining better deposits by applying scientific methods of electrochemistry to electroplating.

All lectures, twelve in number, deal with the theoretical and practical aspects of electroplating and are accompanied by experiments demonstrating the practical application of the above. All experiments are performed using the laboratory set accompanying the course. This consists of all necessary chemicals, glassware, apparatus, textbooks, paper and envelopes, but does not include analytical balance. Copper, nickel, zinc, cadmium, chromium, silver, and brass will be deposited and all solutions will be analyzed for constituents. While plating the above metals, factors governing the characteristics of the deposit will be noted by the student and reported. This course will be ready at a later date.

The prices of both courses are reasonable and time payments may be made if desired. A certificate will be presented to all students successfully completing the course.

Hammond Machinery Builders Announce Appointment of B and H Sales Company as Sales Representative

Hammond Machinery Builders, Inc., Kalamazoo, Mich., has announced the appointment of B and H Sales Co., 4980 Potomac St., St. Louis, Mo., as their representatives in St. Louis for the sale of grinders to the metal-working trades. Mr. H. D. Burke and Mr. J. C. High of the B and H Sales company are well-known in St. Louis and bring to the trade a wealth of knowledge that should be helpful in connection with grinding problems.

G. S. Blakeslee & Co. Break Ground for New Addition to Present Factory

G. S. Blakeslee & Co., 19th St. and 52nd Ave., Cicero Station, Chicago, Ill., manufacturer of degreasing machines and metal parts washers, has announced that ground has been broken and construction started on a two-story addition to their present factory.

This addition will give a 50 per cent increase in their present manufacturing floor space, as well as double their present office space. This addition is said to be the result of an increased demand for Blakeslee degreasing equipment and Blacosolv, the degreasing solvent used in Blakeslee degreasing machine.

Mercoid Appoints New Distributor

The Loeffler-Greene Supply Company, Oklahoma City, Oklahoma, has been appointed local distributor for automatic

controls, Sensatherms, thermostats, and a complete line of controls manufactured by The Mercoid Corporation, 4213 Belmont Ave., Chicago, Illinois. Loeffler-Greene will provide service for the area around Oklahoma City.

George H. Corliss Appointed Regional Manager for Lewis-Shepard

George H. Corliss, advertising and sales promotion manager for the past four years for Lewis-Shepard Co., Watertown Station, Boston, Mass., has been appointed regional manager for the company with headquarters at 1401 Santa Fe Avenue, Los Angeles, California. The company manufactures a full line of lift trucks, floor trucks, lift truck platforms, stackers, portable elevators, portable cranes, special lifters and tiering hoists. Mr. Corliss was formerly associated with S. A. Woods Machine Company, Boston; J. A. Fay & Egan Company, Cincinnati, and the Kewaunee Mfg. Company, Kewaunee, Wisconsin, as advertising and sales promotion manager.

William Gertz Named Assistant Professor at Michigan College of Mining and Technology

William Gertz, instructor in the protective coatings division of the metallurgy department of the Michigan College of Mining and Technology, Houghton, Michigan, has been named assistant professor. Professor Gertz, an alumnus of Michigan Tech, joined the instructorial staff in 1931. He introduced courses in protective coatings two years later, and then built up his division until its work has become extremely comprehensive.

Roxalin Exhibit at Rockefeller Center

Roxalin Flexible Lacquer Company, Inc., Box 775, Elizabeth, N. J., has set up an unusually striking exhibit at Metals & Plastics Bureau, International Bldg., Rockefeller Center, New York, N. Y. Their booth embodies an exhibit of finishes, lacquers, enamels, and synthetics for metal, wood and other bases. A group of illustrations show a "twisting and bending" test for lacquers; also photos of the Trail Blazer, their salesman on wheels, carrying more than 200 samples of products finished with their materials. They also show steel tubes coated with Roxalin Flexible Finishes which the visitor is invited to pick up and bang together to prove that the

Roxalin Display at Rockefeller Center

finish will not chip, flake or peel.

A "live" feature of the exhibit is a revolving four-sided drum which can be set in motion by the means of a switch. This drum shows the following products: 1. Roxyn C, the new synthetic finish which air-dries dust-free in lacquer time and short-bakes to produce a tough, porcelain-like finish which is so highly flexible that it can be blanked and formed. 2. "New Fashions in Finishing", a combination of Roxyn C, described above, and Rinco-Trol, a wrinkle finish which creates beautiful, uniform texture surfaces where size of wrinkle and crater are easily controlled. Rejects are greatly curtailed and repair work easily accomplished without stripping. 3. Flat sheets finished with Roxalin Flexible Finishes and then blanked and formed. The finish does not chip, flake or peel; stands up against abuse in

handling in warehouse and shop; does not become brittle on ageing; tested in steam at 212 deg. F. for two years without loss of flexibility or adhesion. It is this air-dry finish, applied directly to bare, clean metal without primer, that is helping so many companies overcome the problems imposed by limited oven capacity. These flexible no-bake finishes possess unusually excellent adhesion and do not brittle on ageing. 4. Metal Edging for Boxes. Steel strip finished, re-rolled, fed through a stapler which cuts strip to the right length and clinches it onto box corners without brittling, loss of flexibility or adhesion during all these operations.

Conveniently at hand is a dispenser from which the visitor can pick packets containing various finishes on metal strips for twisting, bending and fingernail tests.

Cutler-Hammer Announces Appointment of Joseph Gardberg as Manager of New Orleans Office

Cutler-Hammer, Inc., 12th & St. Paul Ave., Milwaukee, Wis., has announced the appointment of Joseph Gardberg as manager of their new office located at 539 Gravier St., New Orleans, Louisiana. Mr. Gardberg is a graduate of Georgia Tech and has had years of experience both as a consulting engineer and in various other technical circles of the electrical industry. He is thoroughly familiar with the company's line of electric control equipment, safety switches and electrical apparatus. Due to his wide acquaintance throughout southern industry, Mr. Gardberg is said to be particularly well qualified to render direct service to the company's customers in this part of the country.

Mr. Joseph Gardberg

Rustless Iron and Steel Corporation Completes Construction on New $1,500,000 Building

The Rustless Iron and Steel Corporation, Baltimore, Md., has doubled its production capacity with the formal opening of a new $1,500,000 addition to its stainless steel plant, providing for a 20,000 ton expansion of the company's annual ingot capacity. This plant is exclusively engaged in the production of stainless steel and performs every step in the manufacture of stainless steel bars, rods and wire, from the virgin chrome ore to the finished product.

Lincoln Electric Company Opens West Virginia Office

The Lincoln Electric Company, Cleveland, Ohio, announces the opening of a new sales engineering office at 400 North Street, Bluefield, West Virginia. The new office will be in charge of William H. Schuster, who for the past year has been assistant welding instructor in the Lincoln Welding School, Cleveland, Ohio. He will maintain consultation and supply service in West Virginia, Virginia, and Kentucky.

New York Belting & Packing Company Announces Distributor

B. F. Ruether, general manager of the New York Belting & Packing Co., 1 Market St., Passaic, N. J., has announced the appointment of Whittle Hose & Rubber Co., 549 W. Randolph St., Chicago, Ill., as distributor for the complete line of N. Y. B. & P. mechanical rubber goods in the Chicago district. Users of N. Y. B. & P. mechanical rubber goods are now assured prompt and efficient service through the appointment of the Whittle Hose & Rubber Co.

Graham Transmissions, Inc., Announces Appointment of Representative

Frank Campbell Co., sales engineers located in the Commercial Trust Building, 15th & Market Streets, Philadelphia, Pa., have been appointed to represent Graham Transmissions, Inc., 739 N. Broadway, Milwaukee, Wis., manufacturers of the Graham Variable Speed Transmission. Their territory will be Eastern Pennsylvania, Southern New Jersey, Maryland, Delaware and the District of Columbia.

H. B. Kahle Appointed Superintendent of Aluminum Plant at Lafayette, Indiana

H. B. Kahle, who has been head of the Arnold, Pennsylvania, extrusion department of the Aluminum Company of America for the past three years, has been promoted to the position of superintendent of the new extrusion works now in the course of construction at Lafayette, Indiana. A graduate of Allegheny College, Mr. Kahle was first employed by the Aluminum Company in 1917, when he was assigned to laboratory research at New Kensington. Three years later he was made technical supervisor of the Edgewater, New Jersey, works, and in 1922 held the same position at the New Kensington, Pennsylvania, works.

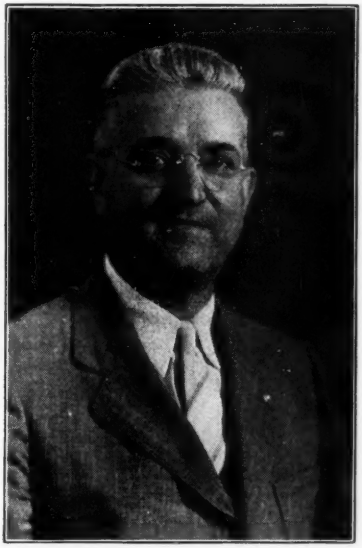
In 1925 Mr. Kahle was promoted to head of the extrusion department at Arnold, only to be made New Kensington sheet mill head a year later. From 1928 to 1934 he was assistant superintendent of the Niagara Falls fabricating p.ant, then again transferred to New Kensington, to discharge the duties he had prior to his present Lafayette position.

L. W. Browne, Vice-President of O. C. Keckley Company

L. W. Browne, formerly president of the Fischer Governor Co., is now associated with O. C. Keckley Company, 565 Washington Blvd., Chicago, Ill., as vice-president in charge of sales and distribution of their steam and liquid control equipment.

E. T. Rees Appointed Manager of Cutler-Hammer Indianapolis Office

The appointment of Mr. E. T. Rees as manager of the Indianapolis, Indiana, office has been announced by Cutler-Hammer, Inc., 12th & St. Paul Ave., Milwaukee, Wisconsin. Mr. Rees' 25 years of experience in the electrical engineering sales field and his five years association with Cutler-Hammer, aptly qualify him to serve the company's many customers in the Indianapolis area. The address of the Indianapolis branch from which Mr. Rees will operate is 307 N. Pennsylvania Avenue, Indianapolis, Indiana.



E. T. Rees

Mr. Otto A. Ray Appointed Manager of Utah Office of Chicago Pneumatic Tool Company

Mr. Otto A. Ray has been appointed manager of the Salt Lake City, Utah, branch of the Chicago Pneumatic Tool Company, Chicago Pneumatic Bldg., 6 East 44th St., New York, N. Y. This is a direct factory sales and service branch and will be located at 119 West Second South, Salt Lake City, Utah.

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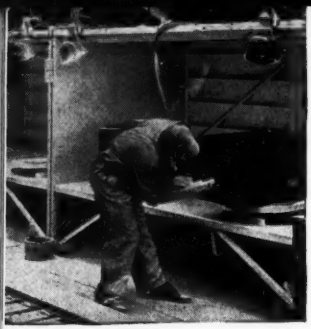


NEW
Plant Equipment & Materials

Jarvis Vario-Flex Flexible Shaft Machine

The line of flexible shaft machines built by The Charles L. Jarvis Company, Middletown, Conn., has been augmented by the addition of the "Jarvis Vario-Flex," illustrated herewith. The feature of this machine is that the surface speed of the grinding wheels can be maintained as the wheels wear down, due to the fact that from 12 to 14 instant speed changes are available without stopping the machine.

The machine is powered by a totally-enclosed ball bearing motor mounted on a heavy duty cast iron base with large rubber-tired ball bearing wheels. The motor can be swiveled to any point in the complete 360 deg. circle. The shaft is equipped with a heavy duty handpiece with two double-row ball bearings.

The machine is made in three sizes 1, 1½ and 2 h.p., to deliver speeds of

Jarvis Vario-Flex Flexible Shaft Machine

2200 to 4700, 2000 to 4500, and 2000 to 4500. The two smaller sizes have ¾-in. diameter spindles and the large machine has a 1-in. diameter spindle.

M-B "Heavy Duty" Air Grinder

The illustration shows the M-B "Heavy Duty" Air Grinder, now being offered by M-B Products, 130 E. Larned St., Detroit,

M-B "Heavy Duty" Air Grinder

Mich. The features of this grinder are the three stages of power and three ranges of speed, together with a simple governor which regulates the maximum speed.

Power in controlled by a series of three air jets and the grinder can be operated on any one of the jets. No. 1 jet makes available the minimum amount of power, No. 2 the intermediate stage and No. 3 the maximum volume, which is in excess of ¼ h.p. The air control is accessible and convenient, consisting of a knurled ring on the back of the body.

The three ranges of speed are obtained by the use of three different governor springs. By changing the governor springs, the maximum speed can be regulated to 25,000, 45,000, or 65,000 r.p.m. Thus the desired speed is available for any type of job. Furnished with each grinder is an adaptor for use in the tool post of a machine, affording a most efficient internal grinder.

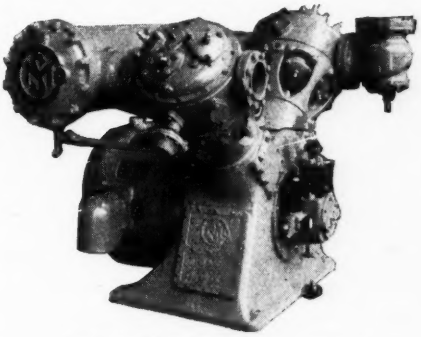
The grinder is packaged in a finished hard wood case. Included with the grinder are the following accessories: oil resisting air hose with dirt filter, six mounted grinding wheels, two drop forged steel wrenches, two speed change springs, one adaptor to permit of using regular grinding wheels with ¼-in. holes, and one tool post adaptor.

Hilo Hilume

A heat resisting vehicle for aluminum, to be known as "Hilume", is now being marketed by Hilo Varnish Corporation, 42-60 Stewart Ave., Brooklyn, N. Y. In one test, after 9 hours of heating on a Hilume coated panel, the Hilume being mixed with Hilo Aluminum Paste, satisfactory adherence to metal was still evidenced. The coating did not crack or peel when the panel was bent over a ¼ in. rod through an angle of 180 degrees. When the panel was heated over an open flame to a dull red heat and plunged into cold water, the finish continued to adhere.

Sullivan Industrial Compressor

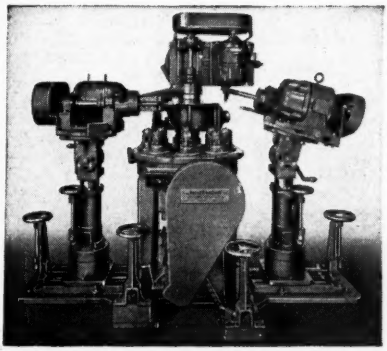
The Sullivan Class WN-112 Air or Gas Compressor, now being made by Sullivan Machinery Co., Michigan City, Ind., in displacement sizes of 378, 480, 642 and 800 cubic feet per minute, is claimed to have great economy of power, maintenance, investment, installation and space. The most advanced design, with the use of modern alloys and precision manufacture, make the performance of this new industrial compressor outstanding. It is a continuous heavy duty machine which, while built for any type drive, reaches its greatest efficiency with the built-in motor. Thus equipped



Sullivan Class WN-112 Compressor

it requires only 6 feet by 8 feet floor space for any of the above capacities.

Vacuum pumps, boosters for steam or



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THE PACKER MACHINE CO. MERIDEN, CONN.

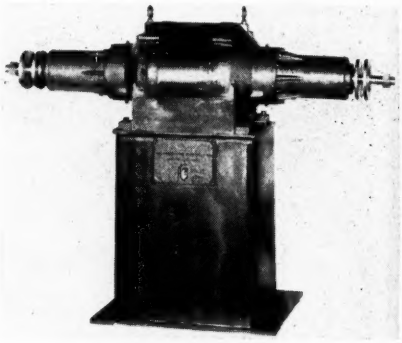
gas and low or high pressure machines are available in this new type of construction. The compressor is equipped with the new "Dual-Cushion" Valves, a feature just recently perfected by Sullivan engineers.

The compactness and ease of installation of the Sullivan WN-112 compressor make it ideal for supplementing present equipment and it can be easily installed at any convenient point where electric power and running water are available.

"Production" Type 322W Buffer

To meet the requirements of heavy duty buffing with unusual distance between wheels (in a "motor-in-head" type of machine), The Production Equipment Company, 5219 Chester Ave., Cleveland, Ohio, announces the Type 322W Buffer shown in the illustration. The machine, which is of heavy construction, is designed with four bearings and furnished with a spindle of very liberal size. The diameter of the spindle extension adjacent to the outside bearings is 1 13/16 in. The spindle housing sleeves are designed to allow ready assembly and disassembly.

The machines are built in ratings from 4 to 15 h.p., and are furnished with enclosed motor, flanges, nuts, safety-type spindle threads, and magnetic starter. The distance between wheels is approximately 4 in., varying slightly according to the rating of the machine.



"Production" Type 322W 10 H.P. 3600 R.P.M. Four-Bearing Buffer

When built in two-bearing construction, this general design is designated as Type 322. The two-bearing machine is furnished with open spindle extension and has a distance between wheels of approximately 3 in. Both designs can be supplied in any desired motor speed, but ordinarily are built for either 1800 or 3600 r.p.m.

Maas and Waldstein Speed Primer

A synthetic primer for use on metal products that air-dries out of dust in 5 minutes and is said to reduce rejects due to shop dust and dirt has been developed by Maas and Waldstein Co., Newark, N. J. This primer is designated as "Speed". It is said to be suitable for use under air-drying lacquer-enamels or baking synthetic enamels, or as a shop coat.

Speed Primer air-dries, or can be force dried or baked, giving a very flexible range from 2 hours at 160 deg. F. to 20 minutes at 275 deg. F. It has good adhesion, excellent building and hold-out properties and is easily sanded. It is supplied in many colors for either dipping or spraying.

Newo Hoist

The Newo Hoist Co., 17309 Fernway Rd., Cleveland, Ohio, announces the development of a hoist of simple design

If you have a finishing problem of unusual difficulty

If you are interested in checking your present schedule for economy

If you are merely curious as to what we have to offer

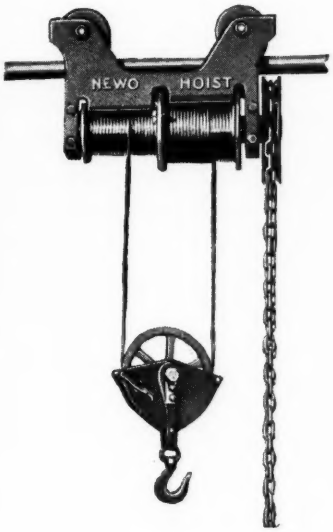
WRITE

The Varnish Products Co.

5208 Harvard Ave. Cleveland, Ohio

Clear Lacquers—Etching Lacquers—Heat-proof White—Bronzing Vehicles—R-700—CEL-U-LAK Primers and Surfacers—Lacquer Enamels — Lacquer Cements — SPECIALTIES.

for use in handling loads which are less than 2000 lbs. and have to be moved only a short distance. Although the hoist



Newo Hoist

is gearless, it has a lifting ratio of approximately 15 to 1, this ratio being obtained by winding the cable on a large drum as a smaller drum unwinds, power is applied by means of a sprocket and endless chain.

A latch acts as a ratchet when raising the load, permitting it to be suspended at any height desired. This latch is disengaged when lowering the load, but instantly stops the downward movement upon being released.

The hoist wheels are grooved for 1½ to 4-in. double strength or I-beam mounting. The hoist is suitable for use as auxiliary equipment to handle loads that require short movement or that require handling until they are ready to be transferred to a tramway, traveling crane, conveyor or other equipment. Special hoists will be built to meet individual requirements.

Burst-Proof Steam Hose

The B. F. Goodrich Company, Akron, Ohio has placed on the market an industrial safeguard in the form of Burst-Proof Steam Hose. When this type of hose fails, it will leak but nothing can cause it to burst except an external blow severe enough to cut its wire reinforcement. It is recommended for 200 lbs. working pressure in all sizes, with a safety factor of 15 to 1 in large diameters and up to 35 to 1 in small diameters.

Burst-Proof Steam Hose is designed with a reinforcement of high tensile steel wire which cannot burn out and deteriorate. The wire is applied in a braided form with openings large enough to permit the rubber to rivet itself, thus preventing any possibility of tube collapse.

THE BIAS BUFF

OVERLAP PLY TYPE

5 sections of this buff equal same width of face as 10 sections of an ordinary buff.

This type buff does a thorough cutting down job on heavy parts.

Overlap Ply principle combined with sturdy construction make this buff ideal for practically all classes of work. We suggest you give it a trial.

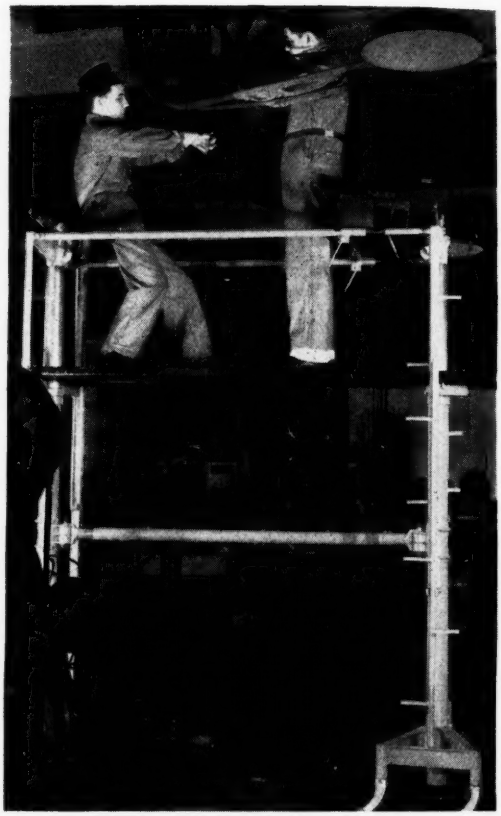
THE BIAS BUFF & WHEEL CO., Inc.
430 Communipaw Ave. Jersey City, N. J.

DecoVator Hydraulic Scaffold

A demountable hydraulic scaffold that may be raised, lowered, extended or contracted, and driven from one vantage point to another by mechanical means actuated from the working platform appears destined to put new flexibility, speed, economy and safety into shop, factory and building maintenance operations where work must be done at varying heights.

The new scaffold, called "DecoVator", is made by the DecoVator Scaffolding Corporation, 2988 E. Grand Blvd., Detroit, Mich. The scaffold is made entirely of steel, is light in weight, and its parts are easily disassembled and transported for quick assembly at distant jobs.

In its assembled state, the DecoVator scaffold provides its own ladder, as well as benches for tools and materials, and the complete lifting and traveling mechanism. The "reach" of the hydraulically raised and lowered platform is considerable; one DecoVator model is from 2 ft. 8 in. in the lowest position to a height that will enable a man to work comfortably up to 16 ft. For a second model the low point is 3 ft. 2 in. and men can service work up to 22 ft. high.



DecoVator Hydraulic Scaffold in use.

The platform is elevated by the worker upon it at the rate of 8 ft. per min., and lowered at 10 ft. per min. The entire scaffold structure, which comes with rubber-tired wheels, may be jockeyed from above, in any direction, at a ground speed of 50 ft. per minute.

The ease with which the new hydraulic scaffold is transported, and the one-man control by which it is adjusted to different levels and moved about horizontally, seem to put the DecoVator definitely in the light of an equipment addition for which many profitable uses will be found.

"NO-TARNISH"
#21 Brass #22 Silver #23 Copper
Durable clear finish for polished metals.
In use nationally for 20 years.
SPECIFY IF FOR OUTSIDE USE
Samples on Request
CLEAVELAND
LABORATORIES & MFG. CO., Inc.
447 Wilson Ave., Newark, N. J.

Valdura Aluminum Paint

The American Asphalt Paint Company, 42 East Ohio St., Chicago, Ill., has placed on the market a high heat resisting aluminum paint which will stand 1000 deg. F., to be known as "Valdura". This

paint is said to have the ability to fuse with and become a part of the surface to which it is applied. Best results are obtained where the temperature exceeds 450 deg. F.

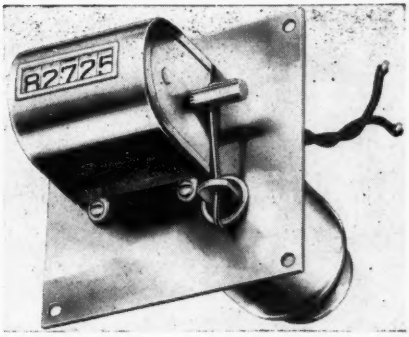
When Valdura is applied to a cool surface, the temperature should be gradually raised to the normal point of operation. Manufactured articles should be baked for an hour at 450 deg. F. It is said to produce a brilliant, silver-like finish that is not affected by smoke, fumes, chemicals or moisture. It is of such smoothness that it is not readily affected by wear and therefore will give unusually long service.

Valdura is recommended for use on manufactured articles, boiler fronts, stacks, steam pipes, kettles, stoves and other metallic surfaces subjected to high temperatures. This paint is said to cover perfectly in one coat. A gallon is sufficient for 650 to 700 sq. ft. of freshly cleaned metal. On rough castings the coverage is slightly less.

"Production" Small Electric Counter

The Production Instrument Company 1325 South Wabash Ave., Chicago, Ill., announces a new line of electrically-operated counters, adapted to economical built-in applications on a wide range of coin-operated machines, production machinery and similar equipment. The counter is unusually compact. The counter itself measures 1⅞ x1½x1¾ in., and is mounted on a plate 2⅞ in. square. The operating relay is attached below the base plate and extends 1⅞ in. below the surface.

The counter is equipped with large, legible number wheels, and black figures on a white background. The lightweight, joined wheels require minimum driving effort, resulting in long-lived dependable recording. There are no spaces between number wheels, an additional feature which contributes to legibility.



"Production" Small Electric Counter

Five number wheels give a capacity of 99,999, which is ample for all requirements in small counters. The operation relay actuates the lever arm of the counter, which has a throw of only ½ in. Positive and dependable action prevents skips or overthrow of number wheels.

The case enclosing the counter mechanism is of steel, designed to afford full protection to working parts. Since the case cover is fastened at the bottom, and Type SEC electric counter is a non-reset instrument, simple, tamper-proof installation may easily be made.

Fairbanks-Morse Built-Together Pump

A two-stage built-together pump has been brought out by Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill., to operate against heads up to 500 feet. In many applications it is said to offer a less expensive alternative for multi-stage and split-case pumps, and its compactness and sturdiness are said to qualify it for portable and semi-portable

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The standard of quality for forty-five years.

THE HARSHAW CHEMICAL CO.

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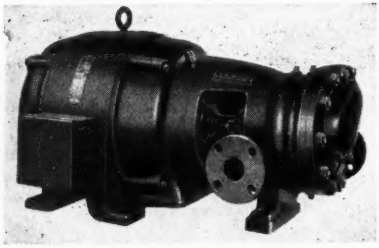


Fairbanks-Morse Built-Together Pump

as well as stationary service.

The new pump is well adapted for all classes of general pumping service with liquids low in viscosity and free from excessive foreign matter. Because of its design, the pump is especially advantageous where space is limited. No special foundation is required; the pump is complete in itself and can be mounted in any convenient horizontal, vertical, or angular position.

The built-together pump consists essentially of a two-stage centrifugal pump, with enclosed bronze impellers, mounted directly on the shaft of a Fairbanks-Morse splash-proof motor. There are no flexible couplings. Two rugged ball bearings, a Fairbanks-Morse construction feature, are said to take all the radial and unbalanced thrust loads. Impellers for the two stages are placed back to back, compensating thrust.

Improved hydraulic design is obtained by placing the first stage unit next to the motor and the second stage on the outside, thus simplifying the cross-over passage and placing the stuffing box under suction instead of pressure. A mounting leg under the pump end is said to give the unit added stability.

McALEER

A New Development

No. 23 White Chrome Coloring Compound for Mirror Lustre.

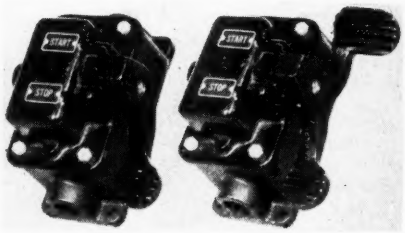
Write for Sample

McALEER MANUFACTURING CO.
2431 SCOTTEN AVE.
DETROIT, MICHIGAN

G. E. Treadle-Operated, Watertight Push-Button Station

For installations where an operator must have both hands free while starting or stopping his machine, General Electric Company, Schenectady, N. Y., has developed a new treadle-operated, watertight push-button station, to be known as the Type CR2940-2A18. The device is also especially suitable for use in damp or wet locations. The station is available either with a single-action or a double-action treadle.

The enclosing parts of the station, case and cover, are made of cast iron and a cast iron foot pedal, or treadle, is built into the cover. This pedal, which operates a standard G. E. heavy duty type push-button unit mounted inside of the case, is provided with stops to limit its travel in either direction. With this arrangement, the operator can



(Left)—G. E. Treadle-Operated, Watertight Single-Action Push-Button Station. (Right)—Double-Action Push-Button Station

push on the pedal as hard as he wishes without endangering the electrical parts of the device.

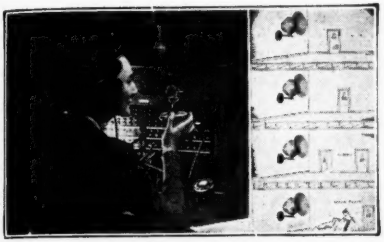
To eliminate moisture, a packing gland is fitted on the treadle shaft where the latter enters the case. This shaft is also provided with a spring which guarantees automatic return of the pedal to the neutral position, thus preventing the push-button unit from remaining depressed because of the weight of the pedal or friction in the packing gland. The blocks, or barriers, in the push-button unit are made of molded material and are sprayed with a Glyptal paint to prevent their being affected by water.

Between the cover, which is held in place by four hexagonal head bolts, and the case is a vellumoid gasket. The case is arranged for conduit connections on either end and is so built that it can

be mounted directly on the floor. The conduit connections will accommodate standard ¾-in. pipe.

Sunco Soundmaster

A sound reinforcing amplifier system with 2,400 times more audio power than the human voice, in a case only 13½x13½x9 in. deep, is a feature of



Sunco Soundmaster

the new Sunco Soundmaster, product of Sun Engineering Co., 4238 Lincoln Ave., Chicago, Ill.

The Soundmaster is a completely self-contained microphone-amplifier-loud speaker system designed to meet the need for a light, five minute set-up unit for use by public speakers, preachers, soloists, orchestras, showmen, and so on. It is powerful enough for audiences up to 3,000 and outdoor areas up to 25,000 sq. ft. Two extra inputs are provided for microphone, music pickup or phonograph. The audio power output is 12 watts, about four times the power of the average console radio and 2,400 times the power of the human voice at loud speech.

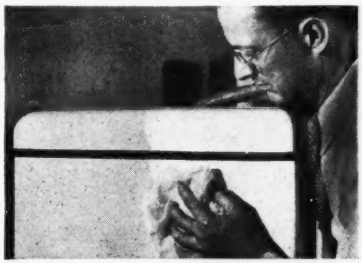
The Soundmaster is equipped with a 12-in. 15-watt speaker which gives large air displacement and thus great carrying power without the effect of loudness. This is a desirable feature in paging or announcing in the better class hotels, clubs, department stores or hospitals. It operates directly from 110 volt 50 to 60 cycle lines, and converters for battery operation can be furnished.

In permanent installations the amplifier and microphone are usually located at a central point connected to speakers installed where desired. Industrially such installations are used for interdepartment calling and paging, between sales counter and stockroom, in churches, bus and railway stations, undertakers, chapels, theaters, amusement parks, carnivals, and so on. No skill is required for installation.

Glossary of Paint, Varnish, Lacquer and Allied Terms

This glossary, by Mr. Ray C. Martin, The Arco Company of California, Ltd., Los Angelss, California, is said to be the most complete work in respect to definitions of paint, varnish, lacquer and allied terms yet compiled, and is proving one of the most popular books to be introduced to the paint industry in recent years. It has been completely revised by the author and brought up to the very last minute in every detail. Anyone interested in the manufacture, sale or application of paint, varnish, and lacquer will find it extremely helpful in its explanation of the nature of materials and the causes and remedies of finishing defects. This glossary consists of 96 pages, size 5¾x8¾ inches, and is bound in a heavy paper cover.

Mr. Ray C. Martin, the author of the glossary, is an experienced technologist in the field of surface coatings, and has spent the past 15 years, since his graduation from the University of Southern California, as research chemist, produc-



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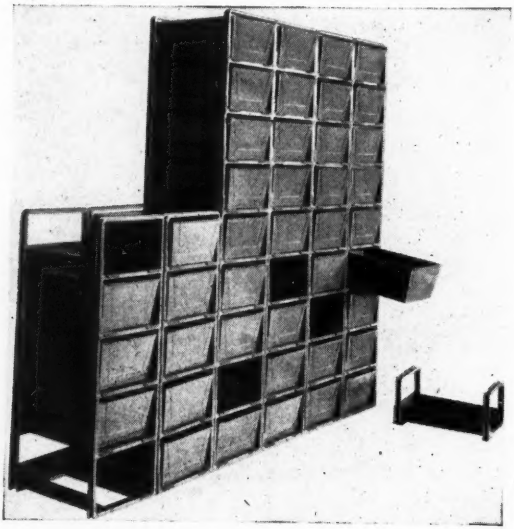
tion superintendent, technical director and in technical service work with such companies as The Glidden Company, General Paint Corp., Devoe & Raynolds Co., Inc. and The Arco Company. The glossary can be obtained by remitting one dollar to Mr. Ray C. Martin, care of The Arco Company of California, Ltd., Los Angeles, California.

Stackracks

Designed originally for orderly arrangement and easier handling of stockroom boxes, the sectional steel racks



Stackracks for Storage of Parts in Process.

known as "Stackracks" are also proving ideal for parts storage in process of assembly, according to their manufacturer, Stackbin Corporation, 53 Troy St., Providence, Rhode Island.

This application of Stackracks, which was suggested by users themselves, takes full advantage of the easy set-up, rigidity, and easy disassembly of the racks. A Stackrack may be set up quickly, without tools, anywhere in the plant, and just as easily taken down and moved elsewhere.

Built in single units, each of which holds a tote pan, Stackracks save space, save time spent piling or unpiling pans, and permit the use of lighter, cheaper pans. Units are built to fit tote pans or boxes of any size, and any number of units may be used to provide a Stackrack of any size or shape.

Roof Ventilator

The Swarthwout Company, 18511 Euclid Ave., Cleveland, Ohio, has placed on the market a rotary roof ventilator for industrial and commercial building application. The improved features include stainless steel, fully enclosed dust tight, oilless ball bearings on which the head turns with the wind. Interior construction is of streamlined steel tubing welded into a one-piece headframe of high strength and minimum friction resistance.

The body of the rotary roof ventilator is designed along modern lines, resulting in a low appearance with a slightly increased area in the discharge openings. Greater capacity per size is obtained in addition to strong and substantial construction. This ventilator is available in sizes from 12-in. to 72-in. throat diameter and is especially adapted to the removal of smoke, fumes, excessive heat, and moisture.

Wheelco Proportioning Capacitrol

An instrument designed to control fuel fired or electric heating units which cannot be successfully controlled by the simple 2-position or 3-position type controller, to be known as the "Wheelco Proportioning Capacitrol," has been brought out by Wheelco Instrument Co., 1929 S. Halsted St., Chicago, Ill. This instrument consists of an electrical device mounted integral with an indicat-

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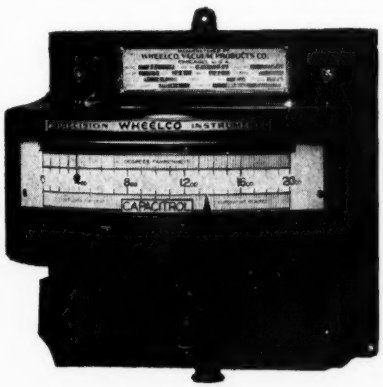
ing pyrometer. The Wheelco Proportioning Capacitrol operates in conjunction with simple valving or contacting equipment.

Where continuously variable fuel input is required to maintain constant



Wheelco Proportioning Capacitrol

temperature and eliminate all overshooting or undershooting, the Capacitrol is said to be ideal. It achieves the effect of a continuous input variation by varying the ratio on ON time to OFF time in a time cycle of predetermined length. The length of the cycle has been chosen sufficiently small so that the change in temperature during one time cycle is practically negligible.

The fuel input obtains its control and varies as a function of the temperature. In other words, the input decreases as the temperature approaches the desired point. At this point the control automatically functions to proportion the ON time to the OFF time to maintain this desired temperature.

The Wheelco Proportioning Capacitrol is said to provide constant even temperatures regardless of varying heat requirements, overcome time lag due to slow reaction of furnace temperatures, and balances the heat input against the heat required by the work.

American Particle Size Analyzer

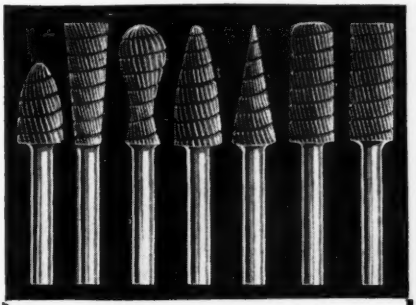
An analysis of particle size distribution of fine, dry powdered materials is said to be successfully accomplished by a roller particle size analyzer which has been placed on the market by the American Instrument Company, Silver Spring, Maryland. Any number of size fractions may be obtained, with size limits as close as desired, the smallest fraction conveniently secured being 0 to 5 or 0 to 3 microns, depending on the density of the material.

Percentage weight of different fractions is duplicable to 0.5 per cent. The American Analyzer is applicable to most dry powdered materials finer than 200 mesh and of a size greater than colloidal. Among the materials successfully dealt with are cement, gypsum, magnetite, flint, feldspar, diatomite, metal, powders, organic dyes, salt, talc, mica, carbon, pigments, china clay, mineral fillers, and so on.

While a series of fractions may be obtained to give complete distribution, a 0 to 5 or a 0 to 3 micron separation in itself furnishes a convenient and rapid check on the standard of quality.

Model IBN Electromode

The Electric Air Heater Co., division of The American Foundry Equipment Co., 557 South Byrkit St., Mishawaka, Ind., has placed on the market an industrial heater to be known as the "Model IBN Electromode". The heat source is a cast aluminum grid which has been poured



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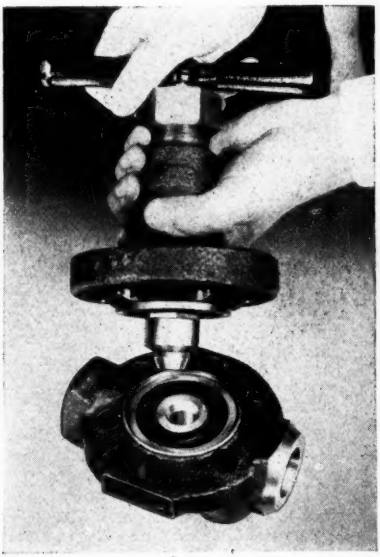
around a calrod heating element. This type of construction is said to eliminate all hot wires and dead air space, thus assuring safe operation at all times.

A motor driven, four-bladed aluminum fan, running in a graphite-impregnated bronze bushing dissipates heat from the grid and circulates the warm air. Heat can be directed wherever it is needed by moving adjustable deflectors. The heater may be suspended from the ceiling or fastened to a wall with angle braces.

Hancock Duravalve

The Hancock Valve Division of Manning, Maxwell & Moore, Inc., Bridgeport, Conn., announces a new type of steel valve to be known as the Hancock "Duravalve". This valve has been developed for high pressure and high temperature service (1500 lbs. at 950 deg. F.). Duravalves are equipped with internal Stellite seats, which are said to reduce valve maintenance due to steam leaking between the valve seat ring and the valve body to a minimum. The new design of these valves is said to permit the Stellite seat steel facing to be easily welded in and serviced even on small sized valves.

Hancock Duravalves are made in one basic size and then tapped or bored for welding ½ in., ¾ in., or 1 in. pipe. The builder states that this simplification



Hancock Duravalve

will take care of 90 per cent of valve requirements on any high pressure power plant job.

Flow Meter Electric Integrator

An electric integrator developed by The Bristol Company, Waterbury, Connecticut, totalizes flow once every 15 seconds. Bristol's Mechanical and Electric Flow meters, for measuring the flow

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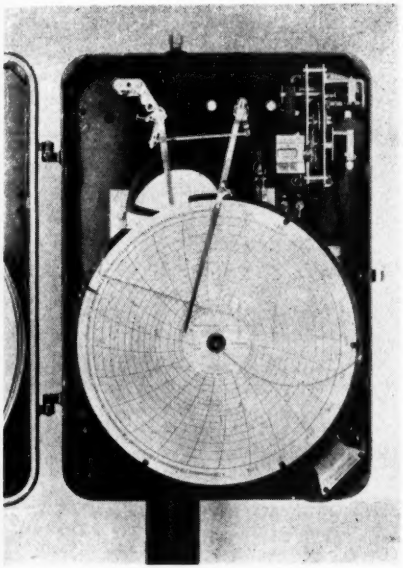
of a gas or non-viscous liquid, through a closed line, are now equipped with this type of integrator.



Flow Meter Electric Integrator

A flat disc cam, shown in the figure partially concealed by the chart plate of the instrument, is specially designed to coincide with the flow law, so that it mechanically computes the square root of the differential pressure across an orifice plate or venturi tube constriction in a pipe line, at 15-second intervals. The valves obtained are totalized by means of a counter and are indicated on a six-figure integrator dial.

In the illustration the integrating mechanism is shown to the upper right of the cam. It consists essentially of a continuously running telechron motor, which operates a counter through a train of gears. These are engaged and disengaged by means of a mercury switch and magnate. The cam rider, which is connected through a link to the recorder pen arm, operates the mercury switch in one direction while on the cam and allows it to return to its original position when off the cam. In the latter position the magnet is energized so that the gears are meshed and the integrator is totalizing the computations of flow. Thus, while the telechron motor runs continuously, it operates the totalizer counter only when the gears through the integrator are meshed.

Wagner Type CP Totally-Enclosed Fan-Cooled Motor

To meet the demand for a totally-enclosed sealed unit for driving equipment which must be operated in atmos-

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pheres heavily laden with abrasive dusts, deteriorating metals and salts, explosive dusts, corrosive gases and extreme dampness, Wagner Electric Corporation, 6400 Plymouth Ave., St. Louis, Mo., has brought out the Type CP Totally-Enclosed Fan-Cooled Motor illustrated herewith.

The motor consists of a skeleton type stator, deeply grooved on the outside to increase radiation, which is provided with totally-enclosed ball bearing end plates with long machined fits to completely seal the working parts of the unit. An external blower mounted on the front end directs cooled air around the front end plate and over the corrugated surfaces and through a baffled back end plate down over the bearing. The motor shaft is of special alloy steel. Ball bearings are of the cartridge type and of the same diameter at both ends. The front end bearing carries the thrust while the back bearing is of the floating self-aligning type. The cartridges are normalized before machining, are machined to very close tolerances, and are designed so that complete lubrication can be carried on during operation. No cored holes are used for introducing lubricant, eliminating contamination of grease by foundry sand. The cartridge caps are also specially designed to prevent entrance of water along the shaft.

The back end plate is of the one-piece

Wagner Type CP Totally-Enclosed Fan-Cooled Motor

deflector type to aid in keeping the bearing cool. Both end plates are provided with threaded air gap holes to make air gap checking an easy task. The feet are of unbreakable steel and are electrically welded to the frame.

Century Fractional Hose Power Motors

The Century Electric Company, St. Louis, Missouri, announces a new complete line of fractional horsepower motors in sizes from 1/6 to ¾ horse-power repulsion start induction, single phase, split phase, capacitor, polyphase and direct current.

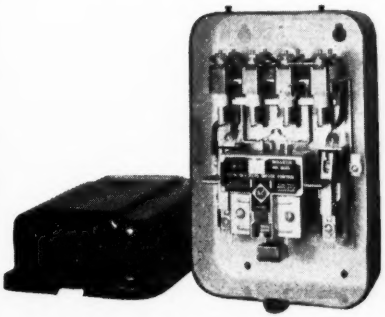
This line is designed with interchangeable mounting dimensions for a given horse power size.

The fundamental principles are the same as have been used by Century for many years, but many improvements have been added which can be appreciated only by inspection.

Allis Chalmers "Ruptor" Equipped Air Motor-Starter

The Allis-Chalmers Manufacturing Company, Condit Works, Boston, Mass., announces a new type of across-the-line air motor-starter, equipped with "Ruptors," known as type AP-7. The "Ruptors" are enclosing chambers which con-

fine and depotentiate the arc formed by circuit interruption. These "Arc-Depotentiating chambers" greatly increase the interrupting ability of the contacts,



Allis-Chalmers "Ruptor" Equipped Air Motor-Starter

and form an isolating barrier between contacts of opposite polarity.

Other features include: vertical make and break- silent operation; enclosed temperature overload relays, affording positive motor protection; unit construction, pole units consisting of individual molded bases mounted on a steel chassis, thus assuring true contact alignment; large silver double break contacts—no contact dressing needed; contacts accessible and quickly renewable; pilot circuit isolated from motor circuit, permitting a separate control voltage for push-button circuit where necessary; motor starter unit arranged for flat surface mounting when applied without enclosure. The starter is furnished for 7½ h.p. at 440 and 550 volts, 5 h.p. at 220 volts, and 3 h.p. at 110 volts.

Bruce Tri-Vac, Li-Vac, and Lub-Vac Buffing Compositions

Bruce Products Corporation, 5712 Twelfth St., Detroit, Mich., has placed a line of buffing compositions on the market to be known as "Tri-Vac", for base metals, "Li-Vac", for plated metals, and "Lub-Vac", a polishing wheel lubricant. These compositions are said to be made by a new method which mixes, shreds, vacuumizes or de-airs, cools and forms the bar in one continuous operation with no interval. This method gives an entirely new structure to the bar and is said to improve the type of package, thus eliminating a large percentage of the waste from sloppage, chipping, breakage and other difficulties in connection with water cooling.

These compositions are also said to have uniform and improved density of structure. Air pockets are said to be eliminated. The new process permits an almost unlimited choice in the size and shape of the bar.

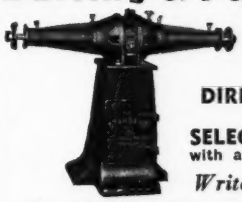
Jetal As a Bond

The Jetal Process developed by Alrose Chemical Company, 80 Clifford St., Providence, R. I., has been found highly efficient not only as a lustrous black finish but also for use on iron and steel as a bond for enamels, lacquers, japan and other baked finishes. The Jetal finish is not affected by high temperatures nor are the articles affected in any way through treatment by the Jetal Process. The Jetal finish is said to be scatch-proof, chip-proof and will not peel, scale or discolor.

Economist Assembly Rack No. 48

To aid in assembling small parts at the bench, the assembly rack shown in the illustration has been developed by Gordon L. Hall, Old Lyme, Conn. The maximum height of the rack is 8 in. and the front to back depth is approximately 12 in. Four standard lengths are available: 8, 12, 16 and 20 in. These four lengths make possible a wide range of flexibility in arrangement. The two sizes of containers or bins will fit all rack lengths and any 8-in. bin is inter-

Buffing & Polishing Lathes



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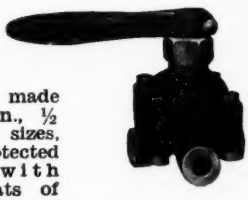
Model 48 Economist Racks Arranged for Use

a maximum of convenience with bins varying in number from three 8-in. bins in a single 8-in. rack to 36 4-in. bins in three semi-circular 16-in. racks. Each bin is easily removed from the rack for refilling or emptying. The racks are finished in olive green.

Nicholson Style J Control Valve

Recent addition to the company's several lines of control valves for all pressures and medium is the model illustrated, designated Style J, a low-priced, non-leaking valve in three and four way types, for operating single and double-acting cylinders utilizing air or oil on pressures to 125 lbs., a product of W. H. Nicholson & Co., 229 Oregon Street, Wilkes Barre, Pa.



Nicholson Style J Control Valve

The valve is made in ¼ in., ⅜ in., ½ in. and ¾ in. sizes, of flat disc, protected seat design, with bodies and seats of semi-steel, discs of bronze. Port areas are equivalent to full area of pipe sizes they accommodate, and port design permits throttling or full opening, as required. All pipes are 90 degrees apart and lead from valve base horizontally. Valves can be dis-assembled for inspection without breaking pipe connections. Operating levers require 90 degrees travel for complete

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cycle and may be easily adjusted radially on valve stem to suit convenience of operator.

"Porcelain Enamel and Manufacturing Company Handbook." This is the title of a booklet which is now being issued by Porcelain Enamel and Manufacturing Company, Pemco & Eastern Ave., Baltimore, Md., in which the use of basic oxides is explained. For a long time inventory losses on discontinued colors in basic oxides has been one of the most persistent problems found in porcelain enameling plants. Blended oxides cannot be used satisfactorily on any but the exact shade of color with which they are blended. In order to avoid costly production delays it is sometimes necessary when stocking blended oxides to purchase a sufficient quantity to provide a margin of safety above estimated requirements. This margin of safety frequently becomes dead inventory which has to be written off the books as a loss.

This booklet, which is designed as a handbook on color matching in porcelain enameling plants, in additon to a complete description of methods and formula for 40 different colors in general use, contains a chart showing actual colors of basic oxides and many of the colors which can be produced by blending, as well as general instruction for mixing countless other colors. Copy free upon request.

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